A
CENTURY OF NEW AND RARE INDIAN PLANTS.

By

P. BRÜHL, Bengal Educational Service,

and

GEORGE KING, M.B., F.R.S., C.I.E.,

Superintendent of the Royal Botanic Garden, Calcutta.

WITH NINETY-NINE PLATES.

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ANNALS

OF THE

ROYAL BOTANIC GARDEN, CALCUTTA.

Vol. V.

PART II.

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NOTE.

The present part of the Annals of the Calcutta Garden is the work of three authors. The descriptions of new and critical species of Ranunculaceæ, which occupy pages 71 to 114, together with the accompanying plates, are the work of Mr. P. Brühl, of the Bengal Educational Service. For the remaining portion of the volume, except the description and figure of *Milula spicata* (which were contributed by Dr. D. Prain, Curator of the Herbarium of this Garden) I am responsible.

G. KING.

ROYAL BOTANIC GARDEN,
CALCUTTA,
March 1896.

DESCRIPTIONS

OF

NEW AND RARE INDIAN PLANTS.

◆

SOME NEW OR CRITICAL RANUNCULACEÆ FROM INDIA AND ADJACENT REGIONS.—

By Paul Brühl.

PLATES 102 TO 128.

Of the Ranunculaceæ figured in plates 102 to 128, only one, *Coptis ospriocarpa*, is an undoubtedly new species. Others are forms sufficiently distinct to claim for them the rank of species of the second order; but the connecting links between them and species already known having been clearly traced, the writer thinks it preferable to emphasize the want of complete independence by enumerating and defining them explicitly as subspecies. Still others, like *Aconitum gymnandrum*, Maxim., or *Adonis brevistyla*, Franchet, themselves discovered comparatively recently, were not known before to occur in the tracts of country which are legitimately included in India as a botanico-geographical region. A fourth group is made up of some species which, from want of material, have been hitherto identified with species to which they undoubtedly do not belong. Finally, some of the plants have been figured here, because they have either never been figured before or, if so and in any case, because they invite, for some reason or other, the special attention of botanists. A connected account of the Indian *Ranunculaceæ* will appear shortly in the *Journal of the Asiatic Society of Bengal*, part ii, as a sequel to the author's *Disputatio de Aquilegia*: it will therefore be sufficient here to refer only to those species which are figured in the accompanying plates, although a number of other species, like those of *Isopyrum* or several species of *Clematis* and *Ranunculus*, would form interesting subjects for discussion. The writer cannot conclude these introductory remarks without alluding to the great disadvantage which he has felt repeatedly whilst engaged in his researches in Himalayan botany which rises from the fact that there are a number of species—*Ranunculus chaerophyllos*, Linn., for instance—the synonymy of which is yet involved in some doubt. These doubts could, most of them, be definitely cleared up, if some of the European botanical societies would undertake the task of forming complete herbaria of the tracts in which such veterans as Caspar Bauhin, Gouan, Guettard, Lespeyres, and others botanized. Finally, two problems may be referred to as worthy of the attention of Indian botanists: the tracing of the connection between the flora of the North-Western Himalaya and that of the Elburz and the Caucasus; and the establishment of the affinities which link the flora of the Central, and still more that of the Eastern Himalaya, to that of Japan. The obstacles in the way of a satisfactory solution of these problems are the scarcity of Caucasian, Turkestani, and Japanese specimens in the Indian herbaria; the incompleteness of our knowledge of the floras of Persia, Afghanistan, and some parts of Turkestan; and our practically complete ignorance of the botany of the extreme Eastern Himalaya. The results of the partial exploration of the Chumbi Valley, which very clearly indicate the close relationship of the flora of the Himalayas east of Sikkim to the Floras of Yunnan, Hupeh, Setchwan, and Kansu, point to a rich harvest which is ready to be gathered in the inhospitable regions which stretch from the eastern frontier of Sikkim to the haunts of the Mishmis and Abors.

THALICTRUM CULTRATUM, *Wall.*

Hooker and Thomson in the *Flora of Brit. Ind.* are already of the opinion that *T. platycarpum*, H. f. et T., is probably only an alpine state of *T. cultratum*. Lecoyer, whose views concerning this form are shared by the writer, formally reduced *T. platycarpum* to *T. cultratum* in his valuable monograph on *Thalictrum*. Related to *T. platycarpum* is a form which was gathered by one of Dr. King's collectors somewhere between the northern frontier of Sikkim and Lhassa. The most important characters which distinguish the two are taken from the ripe fruit; and the differences are rather considerable. Nevertheless a careful investigation into their relationships makes the writer averse to claiming the new form as an independent species, and it appears to him preferable to consider it, like *T. platycarpum*, a subspecies of *T. cultratum*. We have thus—

Subspecies I. CULTRATUM VERUM; a middle-sized or tall herb (40—100 cm. high); pedicels elongate, filiform, 10—30 mm. long; anthers long-linear; stigma very narrowly winged; achenes distinctly stipitate (rarely one or another subsessile), attenuated towards the base, on transverse section nearly anceps, not wrinkled; lateral nerves slightly anastomosing upwards, without stalk 5—7 mm. long.—Kashmir; Garhwal; on the Kedar Kanta and elsewhere; Nipal; Sikkim, 8—12,000′.

Subspecies II. PLATYCARPUM, *H. f. et T.*; middle-sized herb (25—50 cm. high); pedicels elongate, filiform, 10—20 mm. long; anthers elliptic-oblong; stigma broadly or narrowly winged, subsagittate at the base; achenes manifestly stipitate, attenuated towards the base, on transverse section angular subcultrate, not rugose; lateral nerves simple, without stalk 3—4 mm. long, scarcely convex along dorsal, very convex along ventral suture, minutely glandular; (wings of stigma revolute in the ripe fruit).—Western Tibet; Garhwal; Southern Tibet, north of Sikkim.

Subspecies III. TSANGENSE, *P. Brühl*; rather small (15—20 cm. high), very much branched; pedicels short, 3—4 mm. long; anthers linear; stigma broadly winged, very acutely triangular, wings erose and laciniate; achenes subsessile, asymmetrically obovoid, dorsally gibbous near apex, ventrally very convex, on transverse section subangular, glabrous, attenuated towards the base, lateral nerves scarcely anastomosing, 2·5—3 mm. long, wings of stigma reflexed in the fruit.—Tibet, north of Sikkim (*King's Collector*).

PLATE 102. *Thalictrum cultratum*, Wall.: the letters c, h (misprint for p), t refer to subspecies *cultratum verum*, *platycarpum*, and *tsangense* respectively. 1, upper part of inflorescence of *T. cultratum verum*; 2, *T. platycarpum*; 3, *T. tsangense*; 4-6, sepals; 7-9, stamens; 10 and 11, head of achenes; 12, pistil; 13-15, ripe achenes, and 16-18, stigmas, of *T. cultratum*, *T. platycarpum*, *T. tsangense* resp.; *all of natural size.*

CLEMATIS MONTANA, *Ham.*

Shrub or undershrub, climbing or sarmentose; flower-bearing branchlets from the axils of fallen leaves, usually much shortened, scaly at the base; leaves trifoliate; leaflets membranous to subcoriaceous, rarely quite leathery, mostly ovate or ovate-lanceolate, serrate or serrately incised, rarely quite entire; flowers usually crowded; pedicels 3—15 cm.

long; sepals 1—5 cm. long, white, yellow, or reddish, spreading; stamens distinctly shorter than the sepals; filaments glabrous, linear; anthers linear, blunt or subapiculate; achenes laterally compressed, persistent style plumose, 2·5—4 cm. long.

Flowers from April to September.

Geographical distribution—Hindu Kush, Kaffiristan, temperate Himalaya, Moupine, Yunnan, Assam Hills, Chota Nagpur, (Japan).

O. Kuntze enumerates and names under the head of *Cl. montana*, subspecies *normalis*, thirteen varieties, which are mostly characterized by single characters. Now there are specimens which possess at the same time incised (var. *incisa*) and pubescent (var. *pubescens*) leaves, obtuse (var. *obtusisepala*) and yellow (var. *flavida*) sepals, with peduncles shorter than the leaves (var. *brevi-pedunculata*); and it would not have been difficult to define and name a number of other varieties according as the leaves are glabrous, pubescent, or subhirsute, as the pedicels are hairy or glabrescent, as the stamens are longer or shorter than the pistils, as the style is straight or recurved, as the stigma is canaliculate or no. We should thus have performed the remarkable feat of making a single specimen belong to a dozen or more named (!) varieties. That would be Systematic Botany with a vengeance!

The following Indian, Tibetan, and Yunnanese varieties may be distinguished:—

A. Varieties with abbreviated flower-bearing branchlets; leaves of flowering branchlets crowded; flowers one or several, originating in the axils of scales.

Var. a. ANEMONIFLORA, (*Don pro sp., non O. Ktze*); leaflets lanceolate, acuminate, membranous, serrate rarely quite entire, glabrous or nearly so above, hairy or glabrous beneath; flowers appearing with the leaves usually many on the abbreviated branchlets; pedicels longer or shorter than the leaves, glabrous or pubescent; sepals obovate, rounded or obtuse at the tip, 1·5—3 cm. long, beneath subglabrous except at the pubescent edges; stamens usually 80—120. Gilgit (*Tanner!*); Kashmir (*Clarke!*); Hazāra (*Stewart!*); Black Mountain (*Duthie!*); Simla *Gamble!*); Garhwal near Massuri (*Duthie!*); Kumaon, near Naini Tāl, and on the Kedar Kanta (*Royle!*).

Var. β. INCISA, *O. Ktze*; leaflets membranous, lanceolate, acuminate, 1—6 cm. long, incised, cuneate, above more or less coarsely hairy; flowers with the leaves, solitary or crowded on the shortened branchlets; pedicels usually longer than the leaves, hairy or nearly glabrous; sepals oblong, obtuse, mucronulate, 15—25 mm. long, glabrescent on back; stamens 60—90. Garhwal, on the Kedar Kanta 10—11,000′ (*Duthie!*); Nipal (*Scully!*).

Var. γ. CHUMBICA, *P. B.*; leaflets obovate or rhomboid, more or less deeply trifid, mucronate-serrate, cuneate, above adpressedly hairy, beneath more or less villous; flowers with the leaves, crowded on the abbreviated branchlets; pedicels as long as, or longer than, the leaves, villous; sepals oblong or obovate, rounded at the tip and mucronulate, rarely subacute, 15—25 mm. long, pubescent or villous beneath; stamens mostly 25—40. Chumbi (*King's coll.!*); Sikkim, near Ling-tu (*King's coll.!*), Lamtong (*King's coll.!*), Phullut (*King's coll.!*).

Var. δ. PRAECOX, *O. Ktze.*; leaflets pubescent or villose; flowers before the leaves; sepals obovate, rounded, 12—20 mm. long, pubescent beneath. Closely related to γ. Sikkim: on Phullut (*King's coll.!*).

Var. ε. FASCICULIFLORA, *Franchet pro sp.*; leaflets leathery, lanceolate, quite entire, glabrous above, glabrescent beneath; flowers with the leaves; pedicels 2—3 cm., silky; flowers rather small; sepals obovate-oblong, obtuse, densely sericeous beneath; stamens biseriate.—Yunnan.

Var. ζ. GRANDIFLORA, *Hook.*; leaflets membranous or subcoriaceous, ovate or ovate-lanceolate, acuminate, at the base rounded or subcuneate, serrate, rarely quite entire, above glabrous or hairy along the nerves, glabrous to villous beneath; flowers with the leaves, 2 or more on the abbreviated branchlets; pedicels glabrous or nearly so; sepals obovate, at the apex rounded or very shortly and abruptly acuminate or subacute and mucronulate, 3—5 cm. long, beneath glabrescent in the middle; stamens 80-120.

Kashmir (*Herb. Calc. !*); Jaunsar (*Gollan !*); Krōl (*Drummond !*); Sirmor (*Drummond !*); Garhwal (*Herb. Falc. !*); (*Schlich !*).

Var. η. MANIPURENSIS, *P. B.*; leaflets firmly membranous, the terminal ones often 5—9 cm. long, 2—5 cm. broad, ovate, obtuse or subacute at base, narrowly acuminate, incisedly 2—3-fid., coarsely mucronulate-serrate, adpressedly hairy; flowers with the leaves; solitary or in pairs on the shortened branchlets, pedicels rather shorter than the leaves, hairy; sepals ovate or oblong, narrowly acuminate, 25—40 mm. long; stamens 50—80. Manipur, 7,000′—9,500′ (*Watt. !*); Naga Hills (*Colomb !*).

Var. θ. INTERMEDIA, *B. P.*; leaflets firmly membranous, ovate or elliptic, entire or subtrifid, coarsely serrate, puberulous above, glabrous or nearly so beneath; flowers 1—3 on the abbreviated branchlets; pedicels about as long as the leaves, puberulous; sepals lanceolate, shortly and very acutely acuminate, 25—40 mm. long, 10—15 mm. broad, beneath tomentose at the edges, otherwise glabrescent; stamens 60—80. Merging into *e.* Sikkim: on Tonglu (*K.'s Coll. !*).

B. Varieties with the flower-bearing branchlets elongated, scaly at the base; leaflets of flowering branchlets distant; flowers solitary in the axils of the leaves, peduncles eperulate at the base; sometimes with additional abbreviated branchlets.

Var. ι. TONGLUENSIS *P. B.*; leaflets firmly membranous, ovate, acuminate, irregularly serrate, sometimes subtrifid, rounded or subcuneate at base, glabrous or puberulous; sepals lanceolate, acutely acuminate, 3—5 cm. long, breadth $\frac{1}{4}$—$\frac{2}{5}$ of length, in the bud pubescent on the inner surface, outer surface tomentose along margin, glabrescent in the centre; stamens 50—80. Sikkim: on Tonglu (*T. T. ! Gamble ! K.'s coll. !*); Rungbūl 7,800′ (*K.'s coll. !*); Gantūk (*K's coll. !*).

Var. κ. KHASIANA *P. B.*; leaflets firmly membranous, broad-ovate, rounded or subcuneate at base, coarsely pauci-serrate, shortly acuminate, hirtulous at nerves; sepals elliptic or obovate, at the tip very shortly and narrowly acuminate, in the bud glabrous inside, outside tomentose at the edges, otherwise glabrescent; stamens 50—80. Khasia (*Herb. Calc. !*).

PLATE 103. *Clematis montana*, Ham.; 1, flowering branchlet of var. *tongluensis*; 2, flower of var. *khasiana*; 3, flower and branchlet of var. *manipurensis*; 4, flower of var. *anemoniflora*; 5, terminal leaflet of var. *edentata* of O. Ktze; 6, leaf of var. *incisa*; 7, pedicel of var. *chumbica*; 8, outermost stamen; 9, innermost stamen; 10, pistil; 11, stigma of var. *tongluensis*.

CLEMATIS ACUMINATA, *DC.*

A large woody climber, more or less thickened at the nodes; leaves trifoliate leaflets coriaceous to membranous, ovate to ovate-lanceolate, entire or serrate; inflorescence dichasial or cymose-paniculate, three or many-flowered; adult buds cylindric or oblong-ellipsoid; sepals erect, nearly straight or with recurved tip, in open flower entirely tomentose outside or only along the edges; filaments linear, densely hairy; anther, linear, not beaked; achenes compressed, moderately or scarcely thickened at the edges; persistent style feathery.

O. Kuntze unites *C. Leschenaultiana* D. C. with *C. acuminata*; the leaves of the former are certainly sometimes exactly like those of *C. acuminata*, var. *sikkimensis*; they vary also largely in the density of their indumentum; and since the sepals of *C. acuminata* var. *Wallichii* are, when young, densely pubescent on the outside, there is indeed no good character to separate the Javanese plant from *C. acuminata*. Closely allied to *C. acuminata* var. *Wallichii* is Franchet's *C. yunnanensis*, which differs from the former chiefly in the leaflets being smaller and their texture being somewhat firmer, and in the inflorescences usually originating in the axils of branches. We arrive thus at the following arrangement.

Subspecies I. Leschenaultiana, *DC.*; leaflets coriaceous to chartaceous, ovate or broadly ovate lanceolate, terminal ones 5-14 cm. long, more or less covered with coarse hairs; sepals covered outside with coarse brownish tomentum; inflorescences from axils of leaves.—Sumatra, Java, Timor. The statement that it has been found in the Nilgiris rests probably on some error.

Subspecies II. Wallichii, *H. f. et T.*; leaflets chartaceous, ovate-lanceolate, 6—12 cm. long; sepals outside tomentose-marginate otherwise pubescent; inflorescences from axils of leaves.—Flowers from October to December.—Garhwal (*Royle*, *Brandis!*); Kumaon (*Davidson!*); Nepal (*Wallich!*); Bhūtān (*Herb. Calc.!*).

Subspecies III. yunnanensis, *Franchet*; leaflets chartaceous, ovate lanceolate, 3—6 cm. long, puberulous; sepals puberulous outside; inflorescences mostly from the axils of branches.—Yunnan.

Subspecies IV. sikkimensis *Hook. fil. et Thomson*; leaflets chartaceous or subcoriaceous, ovate or oblong, terminal ones 6-15 cm. long; sepals outside tomentose-marginate, otherwise glabrous or pubescent inflorescences from axils of leaves.—Flowers from September to December.—Central and eastern temperate Himalaya; Mishmi and Naga hills; Burma; Yunnan (?).

Var. α. Hookeri, *P. B.*; leaflets ovate-oblong or ovate-lanceolate; inflorescences many-flowered: sepals 10—15 mm. long, ovate-oblong, with obtuse tip.—Simla (*Gamble!*); Sikkim (*Hook. fil.*; *King!*); near Darjeeling (*T. Thomson*, *Gamble!*), Senchal (*Kurz!*); Kurseong (*Clarke!*); Bhūtān, 6,000′, (*Clarke!*); Assam: Jowai 5,000′ (*King's coll.!*); Mishmi (*Griff.!*); Naga Hills (*Griff.!*); Pegu (*Brandis!*).

Var. β. Clarkei, *O. Kuntze* (*emend.*); leaflets broad-ovate; inflorescences 3-flowered, sometimes with some undeveloped additional buds; sepals 15—20 mm. long, ovate-oblong, acute.—Sikkim (*Clarke*; *King.!*).

Var. γ. Andersoni, *P. B.*; leaflets ovate-oblong, short-acuminate; inflorescences several-flowered; sepals 25—30 mm. long, lanceolate-linear, obtuse or subacute and minutely apiculate at the tip. Northern Burma or Yunnan (*Anderson*).

Plate 104. *Clematis acuminata, DC.* 1, flowering branch of *C. Wallichii*; 2, stamen; 3, pistil of the same; 4 and 5, inflorescence and terminal leaflet of *C. sikkimensis*, var. *Hookeri*; 6, inflorescence of var. *Clarkei*; 7, flower of var. *Andersoni*.

Anemone Griffithii *H. f. et T.*

Rootstock woody, more or less horizontal. *Stem* slender, 7—15 cm. high when in flower, glabrous or somewhat hairy below. *Basal leaves* usually solitary, with the undeveloped bud of next year in their axils, very long-petioled, trisect or trifoliolate with the leaflets short-petioled, sparsely adpressedly hairy along the nerves on both surfaces or glabrous on the lower surface; *lateral leaflets* or segments more or less asymmetric, bi- or trifid, sometimes only obscurely so, middle one more or less trifid, all of them cuneate at the base or the lateral ones semicordate, acute at the tip, crenate-serrate or incised-crenate, 12—24 mm. long, crenatures apiculate. *Petiole* sheathing and hairy at the base, upwards glabrous or nearly so, 2—3·5 times as long as the blade. Cauline leaves 3, whorled, similar to the basal leaves, but often rather smaller, petiole only ½ to ¾ the length of the blade. *Peduncle* slender, ebracteate, ¼ to ⅞ as long as the stem below the whorl of leaves. *Sepals* 4—5, membranous, ovate or elliptical, with branching nerves, inserted with a rather broad base, obtuse, 6—10 mm. long, $\frac{3}{5}$—$\frac{2}{3}$ as broad, glabrous. *Receptacle* hemispherical, 1—1·5 mm. dia., glabrous. *Stamens* about 30, $\frac{1}{3}$—$\frac{2}{3}$ the length of the sepals, glabrous; filaments complanate-filiform, outer ones 2—2·5 mm., inner ones 3—4 mm.; anthers elliptic, blunt, about 1·2 mm. long, connective very narrow. *Pistils* 25—30, glabrous, inner ones 2, outer about 1 mm.; ovary ovate, lenticularly compressed, style tapering, of innermost pistils nearly as long as the ovary, of outer ones much shorter. *Achenes* ?—Sikkim: Lachen Valley, 8—9,000′; Chumbi: near Pey-gung-la; Bhutan, near Chuka 6,000′; Mishmi. Flowers in June.

PLATE 105*A*. *Anemone Griffithii*, H. f. and Th.; 1, flowering plant; 2, sepal; 3, stamen; 4, pistil; 5, stigmatic surface.

ANEMONE FALCONERI, *T. Thomson.*

Regel in his *Enumeratio Plantarum cis- et transsiliensium* describes the fruit of *Anemone Falconeri* thus:—*acheniis lineari-oblongis, subteretibus, costatis, puberulis, stigmate brevissimo.*

Prof. Janczewski has drawn attention to a peculiarity which is common to all the species that go to form his subgenus *Hepatica* (*H. triloba, H. transsilvanica, H. Falconeri*); the basal portion of the achene forms a kind of pedicel called hypophyse by Janczewki, which in the ripe fruit is translucent and coloured brown, but which in consequence of shrinkage attendant upon desiccation is apt to be overlooked. The function of this hypophyse is as yet unknown. It appears to be less distinctly developed in *A. Falconeri* than in the other two species. Ripe achenes of *A. Falconeri* have, however, not yet been collected in India, and we invite the attention of Indian botanists to this interesting subject.

PLATE 105*B*. *Anemone Falconeri*, T. Thoms.; 6, flowering plant; 7, sepal; 8, stamen; 9, pistil of *A. Falconeri*.

ANEMONE OBTUSILOBA, *Don.*

The forms which group themselves round the typical *Anemone obtusiloba* are usually associated with *A. rivularis, A. pennsylvanica, A. antucensis* and others, whilst Janczewski in his very interesting *Études morphologiques sur le genre Anemone* unites them with *A. capensis, A. alchemillæfolia,* and *A. glaucifolia,* to form his subgenus *Pulsatilloides.* There exists, however, the closest possible relationship between *A. obtusiloba* and *A. polyanthes,* a relationship which appears to have suggested itself already to Prantl,* and which is indicated by *A. obtusiloba* having a monopodial (zweiachsiges) rhizome like *A. narcissiflora,* Linn., *A. tetrasepala,* Royle, *A. elongata,* Don, *A. gelida,* Maxim., *A. demissa* H. f. et T., and the true *A. rupestris* of Wallich; further by the frequently evinced tendency of *A. obtusiloba* towards the formation of an umbellate inflorescence; by the achenes of some varieties of this species from Kumaon and Nipal being very decidedly compressed, so much so that the writer was for some time doubtful whether they should not be referred to *A. demissa* H. f. et T., to which they certainly do not belong; and finally by the ovaries of *A. polyanthes* sometimes, though seldom, bearing a few stiff hairs, so that it becomes practically impossible to distinguish the pistils of these forms of *A. polyanthes* from those of the flat-carpelled Nipal variety of *A. obtusiloba.* The association of *A. obtusiloba* with *A. glaucifolia* and *A. capensis* appears to me inadmissible. Geographical distribution, of course, counts here for nothing; for not only is the Yunnanese *A. glaucifolia,* Franchet, closely allied to the South African *A. capensis* and *A. alchemillæfolia,* but what is still more remarkable, there are, as is pointed out by Franchet in his *Plantae Delavayanae,* certain points in common between Franchet's species and Baillon's section *Viornanema,* a small, but highly interesting group of African species of *Clematis.* Thus limited there appears to exist a sufficiently close relationship between this section of *Anemone* and the species belonging to the old genus *Pulsatilla* to justify DeCandolle's group-name of *Pulsatilloides*, contrary to Janczewski's dictum: "Il est difficile de compendre pourquoi De Candolle a donné ce nom à une section embrassant deux plantes africaines què ne présentent aucune affinité avec nos Pulsatilles." The hairs on the ovaries, when present, are mostly rigid, as they are in the species which go to form the section *Pulsatilloides*; but in a variety of what I call subspecies *ovalifolium* from Kumaon the hairs are rather soft, whilst in undoubted forms of *A. obtusiloba* from Kansu the ovaries are in some plants densely hairy, in others perfectly glabrous without the plants differing from each other in any other detail. This abolishes, moreover, one of the distinguishing characters of the *A. rupestris* of the Flora of British India. As regards the latter it has to be mentioned that the carpels of the form referred to are usually more or less beset with stiff hairs, quite according to the manner of certain forms of *A. obtusiloba* from Chamba and Nepal. We have, therefore, to consider the value of the *leaves* in furnishing diagnostic characters to serve in the discrimination of the forms allied to *A. obtusiloba.* We begin with *A. trullifolia* H. f. et T. There is now in the Calcutta Herbarium a large collection of specimens belonging to this form, gathered in Sikkim, Chumbi, and Setchwan. They all agree with each other as regards habit, structure of flower, indumentum, and the colour of the sepals; the leaves of most of them are like those shown in (A) of plate 106; the extreme forms (*figs.* 13 *and* 19) are placed side by side, but they are connected by forms with leaves like those represented in figures 14—18. The leaf shown in *fig.* 13 does not differ in form so very much from leaves of *A. obtusiloba* of the shape shown in fig. 4. Franchet endeavours to resuscitate Royle's *A. discolor.* He says in his *Plantæ Delavayanae*: "Je crois qu'il faut conserver le nom d' *A. discolor*, Royle, à une plante très-voisine de l' A. *obtusiloba*, mais qui s'en distingue facilement par la forme nettement pentagonale, à l'angles assez aigus, de ses feuilles. L' *A. discolor* est aussi moins velu." The transition as to form of leaves between those plants which, according to Franchet, would severally constitute the two species *A. obtusiloba*, Don, and *A. discolor*, Royle, is sufficiently illustrated by figures 1—6 of plate 106 to definitely dispose of *A. discolor* as a species or even variety. There are a number of aberrant forms which, to a certain extent, may be distinguished from the typical *A. obtusiloba* by the leaves being more or less distinctly ovate in outline, not pentagonal nor semicircular or subreniform; they gradually shade into the type; but forms like that depicted in (B) of plate 106 look very distinct. I unite them into a subspecies which I call *A. ovalifolia.* Although differing in their outline, such deeply divided leaves as those of some forms of *A. ovalifolia* appear to render the reduction of the *A. rupestris* of the *Flora of Brit. Ind.* imperative; nor does *A. imbricata*, Maxim., lie outside the group of forms which have diverged from the typical *A. obtusiloba.* The *A. rupestris* of the Calcutta Herbarium—there is an original Wallichian type-sheet here—is different from the *A. rupestris* distributed under this name from Kew, and evidently the one described as such in the *Flora of Brit. Ind.* Wallich, as has happened pretty frequently with him, appears to have distributed quite different species under the same name. As, however, the form described by Hooker and Thomson in the *Flora of Brit. Ind.* has to be reduced to *A. obtusiloba*, I have changed its name into *A. saxicola*, leaving the name *A. rupestris* to the species to which doubtlessly Wallich originally meant to give it. The following is a classification of the numerous forms which we thus see ourselves constrained to include in *A. obtusiloba*:—

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* Engler's Botanische Jahrbücher, IX, 1887, page 248.

Subspecies I. TRULLIFOLIA, *H. f. et T.*; mostly villous; scapes erect or more frequently ascending or prostrate, 5—20 cm. long; leaves subsessile or shortly or rather long-petioled (petiole some times as long as the blade), obovoid-subspatulate, more rarely rhomboid or suborbicular in outline, sometimes oblong-linear, cuneate or rarely obtuse or even cordate at the base, coarsely crenate-serrate, more or less distinctly 3—lobed; sepals elliptic, golden yellow, usually 2 to 3 times as long as the head of stamens; carpels densely hirsute.

Var. a. LINEARIS; leaves oblong linear or oblanceolate, entire or scarcely serrate at the apex. Tachienlu region (*Pratt* n. 493!).

Var. β. SPATULATA; leaves obovate-subspatulate or rhombic, entire or very shortly trilobed, cuneate at the base, coarsely crenate-serrate. Sikkim (*H. f. and others!*), near

Thaling, Tsumtong (King's collectors!) ; Chumbi: on Pit-zē-lā, Pan-ka-lā, Oey-gūng-lā ; Phari (*King's collectors!*) ; Bhutan ; N. W. Himalaya ?

Var. γ. ROTUNDIFOLIA ; leaves suborbicular, manifestly petioled, very broadly cuneate, rounded, or shallow-cordate at the base, trilobed to $\frac{1}{3}$ to $\frac{1}{2}$. Sikkim : near Thaling 13,000′, and in other localities (*Cunningham, G. Gammie, King's collectors!*).

Subspecies II. CŒLESTINA, *Franchet* ; scapes erect or ascendent; leaves more or less long-petioled, long-cuneate, subtrilobed, lobes obtuse, middle one incised-crenate, lateral ones entire or scarcely crenate, upper surface somewhat hairy, lower surface silky-villose ; sepals 5, 6—8 mm. long, ovate, obtuse, blue, sometimes white inside, silky outside ; carpels hirsute.—Yunnan.

Subspecies III. OVALIFOLIA *P. Brühl*; more or less villous; scapes sometimes elongate and upright, usually short, ascending or more frequently prostrate or procumbent ; leaves long-petioled, ovate in outline, more or less cordate, trisect or trifolialate, 12—25 mm. long ; middle segment cuneate-obovate, 3-lobed or 3-partite ; lateral ones usually $\frac{1}{2}$—$\frac{2}{3}$ the length of the middle one, broadly obovate or suborbicular, trilobulate ; petiole usually 2 to 3 times the length of the blade ; sepals 5, suborbicular or broad-elliptic, 5—8 mm. long, usually little longer than the androgynoecium ; ovaries hirsute, hairs rigid or rather soft, sometimes quite glabrous ; achenes sometimes much compressed.

Var. α. GEOCHARES ; scapes usually prostrate or procumbent, more rarely ascending, 4—10 cm. long ; sepals greenish-yellow (or quite yellow ?), more commonly dark-red or reddish-brown outside, white inside ; ovaries hirsute or glabrous. North Tibet (*Przewalski!*) ; Kansu (*Potanin*) ; Tachienlu region (*Pratt* 176) ; Phari (*King's collector*).

Var. β. ORTHOCAULA ; scapes erect or ascending, 15—20 cm. long ; sepals yellow, bluish near base ; achenes much compressed, beset with softish hairs. Kumaon, near the Lebung pass, 14—15,000′ (*Duthie*).

Subspecies IV. SAXICOLA, *P. Brühl* (= *A. rupestris* of the *Flora of British India*) ; scapes erect, slender, somewhat hairy ; leaves glabrous or somewhat villose, very long-petioled ; blade suborbicular or reniform in outline, cordate, trisect ; segments subsessile or petiolulate ; lateral segments little shorter than the middle one, 2—3 lobed ; middle segment more petiolulate, subreniform, tripartite, divisions 3- (or 2-) lobed ; segments and lobes overlapping, the latter entire lobulate or paucicrenate ; petiole slender, 2—6 times the length of the blade ; sepals elliptic or broad-obovate, 2—3 times as long as the androgynoecium ; carpels glabrous or more frequently with sparse rigid hairs.—Kashmir (*Falc. No.* 28 !), Pir Panjāl ; Nipal, in Gossain Thān ; Sikkim, 15,000′ (*according to Fl. of Br. Ind.*).

Subspecies V. OMALOCARPELLA, *P. B.* ; villose ; scapes ascending ; leaves trisect, segments obovate, narrow-cuneate, the middle one longer and broader, deeply trilobed, lateral ones incised-lobate, lobules sparsely serrate-crenate ; sepals 6—9, 9—17 mm. long, 2—3 times the length of the androgynoecium, oblong, white with a lead-coloured spot ; carpels nearly flat, margined, quite glabrous or with a few rigid hairs ; style short, hooked.—Nipal (*Scully!*).

Subspecies VI. OBTUSILOBA (TYPICA) ; usually very villose ; scapes erect, ascending, or prostrate, 7—50 cm. long ; leaves long-petioled ; blade reniform, suborbicular, pentagonal, or broad-ovate in outline (when broadly ovate, 4—6 cm. long), more or less cordate, sometimes trilobed to the middle, usually tripartite or trisect ; lateral segments ($\frac{2}{5}$—) $\frac{3}{4}$—$\frac{5}{4}$ the length of the middle one ; segments cleft or lobed ; sepals elliptic, obovate-oblong, or broadly obovate, 2·5 to 4 times the length of the androgynoecium ; carpels subcompressed, hirsute with rigid hairs, rarely sparsely hairy.—Gilgit ; temperate and Alpine Himalaya ; Yunnan.

However greatly the various forms of this subspecies differ from each other in the indumentum—densely villose to nearly glabrous,—the length of the scape, the form and depth of division of basal leaves, the size, form, and division of the involucral leaves, the colour of the sepals—yellow, yellow or white inside and blue or bluish outside, with or without a lead-coloured spot—hairiness of carpels : the variability is so great and the transitions so gradual that it appears to be a thankless task to split up this subspecies into varieties, if the definition of such varieties is to be more than a description of individual specimens.

PLATE 105*C*. *Anemone obtusiloba*, Don. subspecies *saxicola*; 11, sepal; 12, stamens; 13, pistils.

PLATE 106*A*. *Anemone obtusiloba*, sub-spec. *trullifolia*; (*B*) *Anemone ovalifolia*, var. *geochares*. 1—22, leaves: 1—6 of subsp. *typica*: 1 *from Ling-tu*, 2 *N.-W. Him.*, 3 *Dalhousie*, 4 *N.-W. Him.*, 5 *Sandakphu*; 7, of subsp. *omalocarpella*, *Nipal*; 8 and 9, of subsp. *ovalifolia* var. *geochares* from *Kansu*, 10 and 11, the same from *Phari*; 12, of *ovalifolia* var. *orthocaula*, *Lebung Pass*, *Kumaun*; 13—18, of subsp. *trullifolia*, *Sikkim*, *Chumbi*, *Phari*; 19, of subsp. *trullifolia*, var. *linearis*, *Tachienlu region*; 20, of subsp. *saxicola*, *N.-W. Him.*; 21—22 of subsp. *imbricata*; 23 stamens of subsp. *ovalifolia*. 24-31, 33 Pistils: 24—25 subsp. *obtusiloba* vera, *Chenab valley*; 26 subsp. *trullifolia*, *Sikkim*; 27 subsp. *ovalifolia*, *Phari*; 28, 29 subsp. *ovalifolia*, *Kansu*; 30 the same, *Lebung Pass*; 31 subsp. *omalocarpella*, *Nipal*; 33 subsp. *imbricata*; 32, advanced carpel of subsp. *omalocarpella*, *Nipal*.

NOTE.—(In plate 105*C*. the name *A rupestris*, Wall, should be changed to *A. obtusiloba* subsp. IV.)

ANEMONE RUPESTRIS, *Wall. Cat.* 4696 *in Herb. Calc.*

Primary root soon disappearing. Rhizome short, tuberiform, sometimes forked, ovoid or ellipsoid or, when older, short cylindric, 7—18 mm. long, 3—8 mm. thick, emitting filiform root-fibres, covered upwards with the remains of the sheaths of fallen leaves, the apical growing point surrounded by the rudiments of leaves consisting of a three-nerved subevolute sheath and a crenulate or obscurely 5-fid lamina, and often bearing in their axils the rudimentary bud of the flowering stem of the following year. Basal leaves 4—8, crowded, very long-petioled; petioles dilated at their base into a membranous, glabrous or subvillous, very short (2—3 mm.) sheath, slender (1—) 2—8 cm. long, 0·7—1 mm. broad, subglabrous or subvillose; blade membranous, ovate or ovate-oblong in outline, tripartite, trisect, trifoliolate or subpinnate, at the base subcordate or subtruncate, 2—20 mm. long, subisodiametric, subglabrous or somewhat hairy, sometimes silky; terminal segment often petioluled, semicircular or rhombic in outline, 5—14 mm. diameter, three-lobed or oftener tripartite or trisect, with the lateral divisions sometimes subcrenate and petiolulate; lateral segments broadly deltoid or subreniform, rarely subentire, usually three-lobed 4—10 mm. long, ultimate lobes quite entire or serrate-crenate, crenatures obtusely apiculate. Flower-bearing branches scapiform, solitary or 2—6 from the axils of fallen leaves, erect or ascending, slender, 3—18 cm. long, 0·8—1·5 mm. thick, ($\frac{1}{1}$—) $\frac{4}{3}$—$\frac{2}{1}$ the length of the basal leaves, subvillous, towards the base usually less hairy or even subglabrous. Floral leaves 3, whorled, inserted at the middle or above the middle, rarely close to the flower, sessile, free or scarcely connate at the base, 5-nerved, the nerves being fine, simple or branched, ovate, oblong, or obovate, wedge-shaped, quite entire or sparsely and obtusely serrate, 4—10 mm. long, breadth $\frac{1}{4}$—$\frac{2}{3}$ the length, back glabrous or slightly hairy, margin ciliate. Flower solitary, erect. Torus subhemispheric, 1—1·5 mm. in dia., glabrous. Sepals usually 6, spreading, with branched nerves, oblong elliptic or obovate, somewhat concave, broadly cuneate; at the tip obtuse or rounded, sometimes retuse, 5—8 mm. long, breadth $\frac{2}{5}$—$\frac{3}{5}$ of length, upper surface white or light-red and glabrous, lower surface red and glabrous or slightly hairy below, subpersistent. Staminodes none. Stamens 6—18, about half as long as the sepals, spreading, subequal or the outermost distinctly shorter, glabrous subpersistent; filaments dilated, near the apex more as less thickened, the outer ones broadly linear or lanceolate and shorter or all of them broad-ovate or elliptic, 2—3 mm. long, the breadth of the broader ones $\frac{3}{5}$—$\frac{2}{3}$ their own length; anthers broad elliptic, blunt, 0·6—0·9 mm. long, sublaterally dehiscing (bluish). Pistils 6—15, forming a lax head, glabrous; ovaries before fertilization plano-compressed, 2—2·5 mm. long, after fertilization lenticular, elliptic, moderately asymmetric, more convex along dorsal suture, at the base very shortly attenuated, intramarginal nerves little distant from the edges, confluent at the base; style subulate, 0·7—1 mm. long, stigmatiferous along the whole ventral suture. Ovule obovoid. Immature achenes lenticularly compressed, 3—4 mm. long, glabrous.

Flowers in June and July.

Distribution: Central and Eastern Alpine Himalaya.

This species has been already referred to under the head of *A. obtusiloba*; it has some affinities with the subspecies *ovalifolia*, but is at the first glance seen to be a distinct species. It appears to be closely related to *Anemone gelida*, Maximowicz. The following table exhibits their points of agreement:—

Anemone rupestris, Wall.	*Anemone gelida*, Maxim.
Rhizoma breve, tuberiforme, radice primaria mox evanida.	Rhizoma brevissimum, crassum, praemorsum.
Petioli 2—8 cm. longi.	Petioli ad 5 cm. longi.
Caules 1—4 flaccidi, folia basalia interdum duplo superantes praesertim superne pilosi.	Caules 1—3 flaccidi, folia radicalia duplo vel triplo superantes praesertim superne pilosi.
Folia floralia 3 sessilia, basi late cuneata.	Involucrum triphyllum foliis sessilibus cuneatis.
Pedunculus solitarius, elongatus vel brevis.	Pedunculus solitarius, elongatus.
Flos plerumque parvus, erectus.	Flos parvus erectus.
Sepala saepissime 6, 5-nervia, 5—8 mm. long, latitudine $\frac{2}{5}$—$\frac{3}{5}$ longitudinis, saepe obovata, utrinque glabra.	Sepala 6—8, 5-nervia, 9·5 x 4·5 mm. obovata, utrinque glabra, stamina duplo superantia.
Stamina sepalis dimidio breviora.	
Antherae 0·6—0·9 mm.	Antherae 0 6 mm.
Carpella subovata v. elliptica, lenticulari-compressa.	Carpella ovata, lenticulari-compressa.
Stigma stylo ovario duplo vel plus duplo breviori oblique adnatum.	Stigma oblique apice styli crassi impositum (Maximowicz.)

The following table shows their differences:—

Folia basilaria ambitu ovata, seriora trisecta, nunquam plane bis trisecta, segmentum terminale haud raro trisectum, sed lateralia triloba tripartitave neque trisecta.	Folia radicalia late deltoidea, seriora complura bis-trisecta, segmentis omnibus petiolulatis, petioluli primarii terminalis ad 10 mm. laterales 4 mm., secundarii 5 et 2 mm. resp.
Torus glaber.	Torus vix pilosulus.
Carpella 7—15.	Carpella numerosa.
Sepala intra alba vel pallide rubra, extra rubescentia, exsiccata saepe straminea.	Sepala sicca sordide ochracea.

It is therefore quite possible that *Anemone gelida*, Maxim., may finally have to be reduced to the rank of a subspecies of *A. rupestris*, Wall.

Var. *α.* LOBATA, *P. B.*; flowering scapes usually elongated, 8—20 cm. long (but also 3 cm.), flaccid; leaves trisect, terminal segment trilobed, 8—14 mm. broad, usually adpressed hairy, crenatures rather frequent; sepals light-red on both sides or whitish above.—Sikkim: on the Pa-tang-la; Chumbi, at Ley-rong (*King's collectors!*).

Var. *β.* WALLICHII, *P. B.*; flowering scapes 10—15 cm. long, flaccid; leaf-blade densely adpressed hairy; lateral leaflets distinctly petioled, terminal trisect, broad-reniform in outline, about 8 mm. across.—Nepal: Gossain Thān (*Wall!*).

Var. γ. PUSILLA, *P. B.*; scapes usually very short, 2—6 (—10) cm. long, usually erect; leaflets hairy or sub-glabrous, lateral ones trilobed, terminal trisect or subtrifoliate, 5—8 mm. across, terminal segment of the second order sessile or petiolate. Sikkim: Sey-cho-lā, W. of Jongri; Kapur below Kinchinjanga; Pandim-chu 15,000′ (*King's collectors!*).

PLATE 107*A*. *Anemone rupestris, Wall.* 1, var. *lobata*; 2, var. *pusilla*; 5, basal leaves of various specimens of *A. rupestris*, chiefly of var. *pusilla*; 6, sepal of var. *pusilla*; 7, of var. *lobata*; 11, stamen of var. *lobata*; 12, of var. *pusilla*; 16, fertilised, carpel.

ANEMONE DEMISSA, *H. f. et T.*

Rhizome monopodial. Flower-bearing shoots decumbent or ascending or more rarely erect, villose. Basal leaves broadly ovate in outline, trisect or biternately divided with the primary segments more or less distinctly petiolulate; divisions cleft and crenate or serrate, often over-lapping; blade and petiole silky with long hairs or densely villous, rarely with scanty indumentum. Flowers umbellate, more rarely solitary. Involucral leaves 3, whorled, sessile, tripartite and incised. Sepals 5, 5—18 mm. long, white, or pale blue, or white inside and blue outside. Filaments broad-linear to broadly oblanceolate. Ovaries obovate, narrow-elliptic or subovate, compressed, glabrous. Achene flat, broad-elliptic, subasymmetric, 5—6 mm. long, style subadpressed.

Flowers in July and August.

Distribution:—Eastern Himalaya, East Tibet, Yunnan.

Var. α. UMBELLATA *P. B.*; scapes erect or more commonly ascending, 12—40 cm. high; divisions of leaf-segments more or less over-lapping, crenate-serrate; blade silky with soft subadpressed hairs; petioles villose or sericeous; flowers umbellate, pedicels slender, 2—3 cm. long, elongating, longer than involucral leaves; sepals obovate-oblong, 8—12 mm. long; ovaries obovate or oblong; style straight, about half as long as ovary or longer. Sikkim: Thaling 13,000′, Singalila range (*K.'s coll.!*). Bhutan-Tibetan Frontier at La-ri-tin; Chumbi at Sy-um-Chūn-Chen; Phāri (*K.'s collectors!*), Tachienlu (*Pratt*, n. 601!).

Var. β. MACRANTHA *P. B.*; scapes decumbent or ascending, about 10 cm. long; leaves as in α; flowers usually in pairs; pedicels about as long as involucral leaves; sepals broad, elliptic 1·5—2 cm. long; ovaries ovate, style much shorter, tapering; stigma oblique-acute, narrow.—Tachienlu region (*Pratt* n. 745!).

Var. γ. VILLOSISSIMA *P. B.*; scapes decumbent or ascending, flaccid, 3–20 cm. long; leaves oad-ovate to subreniform in outline, 1—5 to 3 cm. across, like the petioles and scapes very villose; leaflets divided into overlapping lobes and crenatures; flowers sometimes solitary, usually in few-flowered umbels; flower-bearing pedicels often not longer than involucral leaves, finally elongating; sepals 4—6 mm. long, obovate, mostly white on both sides, sometimes yellowish-blue outside; ovaries obovoid or subcylindric, style usually short and thick, stigma capitate, subterminal.—Sikkim: near Jongri 13,000′, on the Zey-lap-lā; Chumbi: near Le-rong. (*King's collectors!*).

Var. δ. CONNECTENS *P. B.*; scapes suberect, flaccid, like the petioles and petiolules villose, 10—15 cm. long; division of leaves slightly over-lapping, crenate-serrate, blade rather scantily hairy; flowers solitary; pedicels slender, about 2—3 times the involucral leaves; sepals obovate, 4—6 mm. long; ovaries elliptic-oblong; style short.—Sikkim: near Rang-chen 15,000′ (*King's collector!*).

Var. ε. MONANTHA *P. B.*; scapes suberect or ascending, slender, 5—12 cm. long, subvillose; divisions of slightly hairy blade spreading, not over-lapping; blade 2—2·5 cm. across; flowers solitary; pedicel distinctly longer than the involucral leaves; sepals obovate-oblong, cuneate, about 1 cm. long, white; androgynaecium forming a conspicuous globular head, stamens 30—40, pistils 40—50; filaments linear and linear-lanceolate; ovaries elliptic-oblong, moderately compressed; style about half as long as ovary, recurved.—Sikkim: on the Tankra-Lā 15,000′ (*G. Gammie!*). This variety is possibly identical with Franchet's var. *yunnanensis*.

PLATE 107*B*. *Anemone demissa*, H. f. & Th. 1, var. *umbellata*; 4, var. *monantha*; 8, sepal of var. *umbellata*; 9, of var. *villosissima*; 10, of var. *monantha*; 13, stamens of var. *umbellata*; 14, of var. *villosissima*; 15, of var. *macrantha*; 17, pistil of var. *umbellata*; 18, of var. *villosissima*; 19, of var. *macrantha*; 20, of var. *monantha*; 21, achene of var. *umbellata*.

ANEMONE ELONGATA, *Don*.

Rhizome woody, stout, fusiform. Basal leaves very long-petioled with the nerves little prominent, reniform or semicircular in outline, usually rather shallow-cordate, deeply tripartite or trisect, 4—12 cm. from base to tip, paler beneath, subglabrous or more or less pubescent, especially along the nerves; lateral segments trapezoidal or unsymmetrically obovate in outline, often semicordate, unequally bipartite, outer division bifid, inner irregularly trifid, secondary segments cuneate, and coarsely and irregularly serrate; petiole shortly sheathing at the base, slender, 2—6 times the length of the blade, subglabrous or moderately hairy. Stems erect, longer than the leaves, 30—100 cm. long, glabrous or somewhat pubescent, usually villose at the insertion of involucral leaves. Inflorescence a large, lax, subumbellate cyme. Involucres of the first order usually 2-, more rarely, 3-leaved; leaves cuneate at base, broad-cuneate, 4—14 cm. long, glabrous, subglabrous, or densely pubescent along the nerves, 3 tripartite, middle segment trifid, lateral bifid, all serrate; involucres of second order 1—3-leaved, leaves 3-cleft, densely villous at base; involucral leaves of the third order 1—2-leaved, 2—3-fid sparsely serrate; involucral leaves $\frac{1}{3}$ to $\frac{1}{2}$ the size of those of the next higher order. Peduncles of first order 8—30 cm. long, very slender, glabrous or slightly hairy, base usually densely villous; secondary peduncles 2—8, rarely all of them simple, usually the central one and one or two others simple, the remainder umbel-bearing, rather unequal in length. Pedicels pretty slender, slightly puberulous to densely silky-pubescent. Sepals 5, obovate, 9—20 mm. long, $\frac{1}{2}$ to $\frac{2}{3}$ as broad, white, glabrous. Stamens 50—70, unequal, the longest ones $\frac{2}{5}$ to $\frac{3}{5}$ of sepals; filaments complanate, the outermost rarely filiform, linear; anthers cordate-subrotund, 1·2—1·8 mm. long. Pistils 10—15, sessile, 3—3·5 mm. long, glabrous; ovaries compressed to nearly flat, ovate to oblong, slightly oblique, narrowly or broadly marginate; style slightly tapering into the obtuse stigmatose apex, from $\frac{1}{2}$ to nearly $\frac{1}{1}$ of ovary. Achenes usually only few (1—3, sometimes 6) attaining maturity, flat, elliptic or elliptic-oblong, nearly symmetrical on lateral aspect, rather narrow-margined, about 1 cm. long, persistent style rather central, permanent basal part short, straight or nearly so, not reflexed and nearly contiguous to achene. Seeds and sides of achenes longitudinally ribbed.

Flowers in July.

Garhwal, 9—10,000′ near Rāmri (*Duthie!*); Kumaon, 9—10,000′: in forests near Sosa, Shinko-ta (*Duthie!*); Nipal; Khasia, 5,000′ (*Hooker*).

From the form of *A. polyanthes* with compound umbels this is pretty easily distinguished by the rarer indumentum, the less regular umbels and umbellules, the subcentral and straight persistent style, and the distinctly ribbed seeds. A plant, in nearly every respect like *A. elongata*, but with one-sided and recurved persistent style, was gathered by Maingay in Northern China on the Shan-tung range (3,500′). It is not referred to in Hemsley's Enumeration. The specimens of Wallich's *Anemone curta* and *Anemone geraniifolia* in the Calcutta Herbarium are umbellules of either *Anemone elongata* or of the compound form of *Anemone polyanthes*. *Anemone polyanthes* is completely linked with *A. narcissiflora* by numerous intermediate forms from Turkestan, Tibet, and Northern Sikkim; it must therefore be reduced to the rank of a subspecies of *A. narcissiflora*.

PLATE 108. *Anemone elongata*, Don. 1, sepal; 2, stamens: (*a*) outer, (*b*) middle, (*c*) inner; 3, pistils: (*a*) outer, (*b*) innermost; 4, achenes: (*a*) and (*b*) from *Khasia*, (*b*) half of pericarp cut away to show the seed; (*c*) *N. W. Him.*, unripe; (*d*) *China* Maingay's specimen referred to in the text; (*e*) of *A. polyanthes* var. *longipedunculа*, *P. B.*, *Sikkim*; (*f*) of *A. polyanthes* typica, *Kumaon*; (*g*) the same, *Sikkim*; (*h*) of *A. narcissiflora*, Pyrenees. 5, *a—d*, *A. geraniifolia*, Wall. Cat. 4693 in Herb. Calc., (*a—c*) stamens, (*d*) pistil; (*e*) pistil of *A. rivularis*. 6, *A. curta*, Wall. Cat. 4690 in Herb. Calc., *Sylhet*, stamens and pistil; 7, *A. rivularis*, Wall. Cat. 4692, *Nipal*.

ADONIS BREVISTYLA, *Franchet*, var. TRICHOCARPA, *P. B.*

The plant figured on plate 109 belongs to the group of species of which *A. cærulea*, Maxim., *A. Davidi*, Franchet, and *A. brevistyla*, Franchet, are members. The latter two are known to the writer only from Franchet's lucid descriptions and the accompanying figures. Our plant differs from *A. Davidi* by the stem being 40—50 instead of 20—30 cm. long, by the leaves being rather distant, the lower internodes being 7·5—11 cm. instead of 5—7 cm. long, by the vagina of the lowest leaves being 1 cm. or less instead of 2·5—3 cm. long, by the lateral branches being 10—20 cm. instead of about 5 cm. long, by the uppermost leaves being considerably smaller than the lower ones, by the petals being apparently smaller (13—15 instead of 16—22 mm.) and more or less sulphur-yellow instead of bluish.

The chief differences appear to be in the more slender habit of our form, in the shortness of the sheaths of the lower leaves, and the colour of the petals. From Franchet's *A. brevistyla* it differs by the leaves not being densely crowded, by the sheaths of the upper leaves being short, by the segments of the first order being ovate-oblong or ovate-lanceolate in outline and not ovate-deltoid, by the number of sepals being 5 instead of 6—7, by the ovaries being hairy and not glabrous, and by the style not being very short in comparison with the ovary during flowering. The affinity to *A. cærulea*, Maxim. appears to be much less close. The following is a detailed description of our plant.

A perennial herb, glabrous except the ovaries, 30—50 cm. high when in flower. Rhizome descending, subcylindric, covered at the apex with oblong obtuse scales. Stem erect, straight or flexuose, slender, obtuse-angled, simple or oftener branched upwards, leafy from near the base, 2—3 mm. thick near base; branches 0—3, spreading, very slender, leafy, often overtopping the main axis. The leaves may be considered as sessile or nearly so, the lower pinnæ being inserted near the base, but very small and of the appearance of stipules; petioles dilated into a short sheath, half-stem-clasping; suprabasal pinnæ in outline ovate-oblong, below bipinnatisect, lower 10—16 × 4—7 cm., uppermost 2—5 cm. long; rhachis canaliculate, lower pseudo-petioles 4—9, upper 2—7 cm. long; leaf-segments opposite, subopposite, or alternate; lowest primary segments (pinnæ) springing from the vagina, ovate or subrotund in outline, 5—18 mm. long; the others ovate-lanceolate; secondary ones sessile ovate-oblong and lanceolate in outline; laciniæ lanceolate, mucronate, incised or quite entire. Inflorescence centrifugal. Flowers terminal on main axis and branches; peduncle 5—30 mm. Sepals 5, subequal in length, unequal in breadth, membranous, greenish, with branched nerves, elliptic-oblong or one or the other obovate-oblong, subacute, 8—11 mm. long, 3—4·3 mm. broad, at the margin often microscopically papillose. Petals 7—13, $\frac{6}{5}$ to twice as long as the sepals, with 3 repeatedly divided nerves (nervelets subparallel), cuneate-obovate, obtuse or subrotund at the apex, 12—15 mm. long, 4·5—5·5 mm. broad, white, yellowish near the base. Stamens 30—40, unequal in length, filaments of inner stamens shorter, about 3 mm. long, plane, dilated towards the base, outer 3·7—5 mm. long., narrow-linear, scarcely widened below; anthers equal, oblong-elliptic, blunt, about 1·5 mm. long, laterally dehiscing. Pollen globose. Pistils 15—30, inserted on a short-cylindric torus, forming a globose head; ovaries biconvex, margined, ventrally gently curved, dorsally very convex, ciliate, on the sides puberulous; dorsal nerve simple, ventral divided a little above the bifurcation of the basal nerve, in two branches, the right one of which, seen dorsally, is ovule-bearing, the left one sterile; style shorter than the ovary, apex recurved, stigmatiferous on ventral suture. Ovule hemianatropous, inserted with a broad base, with two integuments, micropyle directed towards the base of the ovary. Achenes rather numerous, sessile, gathered into a globose head of 1 cm. diameter, asymmetrically obovoid, the ventral suture being nearly straight, the dorsal one very convex, about 5 mm. long, ventrally keeled, rugulose on the sides, puberulous, style hooked, much shorter than the achene proper.

PLATE 109. *Adonis brevistyla*, Franch., var. *trichocarpa*. 1, sepal; 2, petal; 3, inner stamen; 4, outer stamen; 5, pistil; 6, the same, one-half of the pericarp removed; 7, pistil, dorsal aspect; 8, section through ovule; 9, ripe carpel; 10, longitudinal section through the same; 11, outer epidermis with hair from ripe carpel; 12, group of sclerenchyma cells from ripe carpel.

RANUNCULUS AUCHERI, *Boiss.*

Root-fibres thin-cylindric; leaves subisodiametric, trisect; segments usually petioled, deeply cut, more rarely only lobate; longer laciniæ mostly linear; flowers solitary or few or forming a many-flowered, often divaricate corymb; sepals spreading, persistent; nectariferous staminodes broad obovate, subasymmetric, about 1 cm. long, persistent; nectarial scale free, conspicuous; gynæcium ovoid; ovaries flat, broadly semi-ovate or semi-obovate, dorsally very convex, subabruptly attenuated into the style, glabrous or more or less beset with stiffish hairs; style hooked at the tip; achene compressed, glabrous or somewhat hairy, smooth.

Flowers in May and June.

Distribution: Persia, Afghanistan.

The Afghan specimens vary considerably in the thickness of the root-fibres, in the relative length of style and ovary, and in the degree of division of the leaves. It will therefore be preferable to reunite *R. elbrusensis* with *R. Aucheri*. *R. eriocarpus*, Boiss, too, is hardly more than a form of *R. Aucheri*. Taking the latter to be a good species of the first order because of its tomentose carpels, we arrive at the following arrangement.

Subspecies I. ELBRUSENSIS, *Boiss.*; root-fibres oblong cylindric; leaves trisect; segments sessile; laciniæ subacute; ovaries hairy, about twice the length of the style.—Elbrus.

Subspecies II. AUCHERI TYPICUS; root fibres thin-cylindric; leaves trisect, at least the terminal segment petiolulate; laciniæ mostly subacute; ovaries hairy or glabrous; style $\frac{1}{2}$ to $\frac{1}{1}$ the length of the ovary.

Var. α. BUNGEANA, *Boiss.*; leaf-segments only lobed.—Persia.

Var. β. PERSICA; leaf-segments tripartite or trisect; flowering plant 30—50 cm. high; inflorescence many-flowered, corymbose; style usually about as long as the ovary.—Southern Persia (*Kotschy !*).

Var. γ. sikaramensis, *P. B.*; leaf segments tripartite or trisect, often subpinnately cut flowering plant 2—12 cm. high; inflorescence 1-, more rarely 2-flowered; style $\frac{1}{3}$ to $\frac{3}{4}$ the length of the ovary. Sikaram, 12,600′ (*Aitch!*).

Subspecies III. hariabensis, *P. B.*; root-fibres slender, cylindric or fusiform; leaves twice trisect; segments of the first order long-, of the second order short-petioluled, the latter deeply cleft, laciniæ narrow-oblong, obtuse or rounded, small; ovaries broadly semi-ovate, glabrous; style about $\frac{1}{4}$ the length of the ovary. Kurrum, on the mountains bordering the Hariab valley, 10,000′ (*Collett!*). Flowers in May.

Plate 110. (A) *Ranunculus Aucheri*, Boissier, subsp. *typicus*, var. *persicus*. (B) *R. Aucheri*, subsp. *typicus*, var. *sikaramensis*. (C) *R. Aucheri*, subsp. *hariabensis*. 1, sepal of *R. hariabensis*; 2, nectarial staminodes of (A), (B), (C); 3, stamen of *R. hariabensis*; 4, pistils of (A), (B), (C).

Ranunculus afghanicus, *Aitch. et Hemsl.*

Thicker root-fibres stout-filiform or fusiform; flowering stem 5—25 cm. high, silky villose; basal leaves rather long-petioled, blade reniform, cordate, 1·5—3 cm. across, trilobed to about $\frac{1}{3}$ to $\frac{1}{2}$, glabrous; middle lobe cuneate-obovate, lateral ones trapezoidal, much broader, unequally bilobed; lobes and lobules crenate; inflorescence one-to many-flowered; peduncles patulous or ascending; bracts trisect, segments linear or oblanceolate, obtuse; sepals patent, elliptic or obovate-oblong, villose; nectariferous staminodes about 1 cm. long, at least twice as long as the sepals and androgynoecium, broadly asymmetrically obtriangular, like the sepals persistent (always?); nectarial scale free, conspicuous, obtriangular; filaments and anthers linear; pistils numerous, 1·5—2 mm. long, compressed, broadly semi-ovate; glabrous or sparsely beset with stiff hairs, dorsal nerve little remote from the margin; style about $\frac{1}{2}$ as long as the ovary, emerging from it rather abruptly; achene compressed, semi-obovate, very convex dorsally, style hooked, much shorter than the achene proper.

Flowres in June.

Afghanistan: Kurrum valley: on grass-meadows. Karchatal 10,500′ (*Aitch.!*); mountains of the Hariab valley, 8—9,000′ (*Collett!*).

Regel's description of his *Ranunculus Olgæ* (1882) from Autshi-Dagana, Turkistan, agrees entirely with that of the Afghan specimen of *R. afghanicus*.

Plate 110*A*. *Ranunculus afghanicus*, Aitch. et Hemsl. 1, Tall; 2, dwarf specimen; 3, sepals; 4, nectarial staminodes; 5, stamen; 6, pistils; 7, pistil of *R. Sprunnerianus*, *Boiss.*; 8, achene of the same.

Calathodes palmata *H. f. et T.*

The genus *Calathodes* has been reduced by Baillon and Prantl to the rank of a subspecies of *Trollius*. And, indeed, as long as the generic separation had to be chiefly based on the presence or absence of the so-called petals, and as the latter are sometimes reduced to three in *Trollius pumilus*, the reduction of *Calathodes* to *Trollius* appeared unavoidable. Recently, however, ripe fruits of *Calathodes palmata* have been gathered, and their examination shows that *Calathodes* is really a good genus. For it is found that in the latter genus the torus elongates after flowering by an interstitial growth of the tissues between the insertion of the sepals and that of the carpels. That we have not to deal with a coalescence of fruit-stalks, as has been supposed, is clearly proved by a cross-section through the elongating part of the torus (see fig. 12 of plate 112). In the Western Chinese plants the ovaries have a wing-shaped cellular outgrowth near their base, the lower portion of which becomes involved in the interstitial growth of the torus, so that the angles of the latter become winged; in the Sikkim specimens this wing-like appendage is, however, wanting, so that it cannot be made use of as a generic character; it is hardly of sufficient importance to found a separate species on. If *Caltha* be upheld as a genus the definitions of *Caltha, Calathodes*, and *Trollius* would be as follows:—

Caltha, Linn.; leaves entire; nectariferous staminodes none; torus between the insertion of the calyx and the gynœcium not elongating after flowering; seeds usually inserted all along the ventral suture; chalazal part of seeds more or less spongy.

Calathodes, H. f. et T.; leaves palmately divided; nectariferous staminodes none; torus elongating after flowering between the insertion of the calyx and the head of follicles; seeds inserted below the middle, chalazal part not spongy.

Trollius, Linn.; leaves palmately divided; nectariferous staminodes present; torus not elongating by interstitial growth; seeds inserted all along the ventral suture of the follicles, chalazal part not spongy.

Varieties of *Calathodes palmata*—

Var. *a.* ANARTEMA, *P. B.*; ovaries exappendiculate. (Flowers solitary.) Sikkim, 10,000′ (*Hooker fil !*).

Var. *β.* APPENDICULATA, *P. B.*; ovaries and follicles dorsally with a wing-shaped appendage near the base. Inflorescence racemose or paniculate. Hupeh (*Henry*, 1885-86, *No.* 6977 !) See also Hooker's Icones, plate 1935.

PLATE 112. *Calathodes palmata*, H. f. Th. 1, flowering plant from Sikkim; 2, head of follicles of variety *β*; 3, sepal; 4, stamens; 5, gynœcium of variety *a*; 6, pistil of variety *a*; 7, the same, with the ovary cut longitudinally; 8, pistil of variety *β*; 9, the same cut longitudinally; 10, a pistil less magnified; 11, head of ripe follicles seen from above; 12, cross section through torus below head of follicles; 13, ripe seed; the figure at the lower right edge represents a ripe follicle just before dehiscence.

TROLLIUS PUMILUS, *Don.*

The genus *Trollius* is composed of two form-groups—one group which is characterized by the nectariferous staminodes being usually long-clawed, and more especially by their being distinctly thickened at the upper edge; whilst the staminodes of the second group have a very short claw and their upper margin is thin, like the margin of an ordinary petal. The former comprises the various varieties of *T. pumilus*; to the latter belong the difficultly separable species *T. europaeus, T. asiaticus, T. laxus*, and *T. lilacinus*, with their subspecies *T. altaicus, T. acaulis*, and others. According to Maximowicz the discrimination of the Northern Asiatic and European species would be according to the following scheme:—

A. Flores lilacini ... ... *T. lilacinus.*
B. Flores flavi vel aurantiaci—
  a. Styli discolores ... ... *T. altaicus.*
  b. Styli concolores—
    a. Petala stamina superantia ... *T. asiaticus.*
    β. Petala staminibus subæquilonga vel iis subbreviora ... ... *T. laxus.*
  γ. Petala staminibus breviora ... *T. europaeus.*

The relative length of stamens and staminodes is, however, an unreliable character, even in *T. asiaticus.* This is shown by figures *l, m, n,* of which *l* is from an old specimen of Schangin's and *n* is from a specimen on the same sheet and in nearly every respect exactly like the former; but whilst in *l* the stamens are distinctly longer than the staminodes, in *n* the staminodes are about twice the length of the stamens; *m* is from another old Siberian specimen of *T. asiaticus* in which the staminodes are only slightly longer than the stamens. In *T. europaeus* the staminodes appear always to be a little shorter than the stamens; they are also more distinctly obovate. After all it may be better to fall back on Linnæus' way of distinguishing *T. europaeus* from *T. asiaticus* by the sepals being connivent in the former and patulous or spreading in the latter, although it must be confessed that this method has its difficulties. Regel's *T. dshungaricus* will then have to be separated again from *T. europaeus.* Its affinities are perhaps more with *T. laxus.* The character by which *T. altaicus* is separated from *T. asiaticus* is hardly of sufficient weight to prevent its being considered a subspecies of the latter.

Of how little importance the relative length of ovary and style as a diagnostic character may be, is exhibited by fig. 5 *g* to *k*, all of which are from Siberian and doubtlessly good specimens of *T. asiaticus*; compare, for instance, *h* with *k*. This has an important bearing on *T. acaulis* as a species of the first order. Here the pistil has very commonly the shape depicted in fig. 5, *e*; but in a specimen, for instance, from Phūlaldarū in the Nila valley the pistil is exactly like 5, *b*, which represents the pistil of *T. americanus* Mühlb. from North America. Although the majority of specimens of *T. acaulis* are similar to those described and figured by Lindley in the Botanical Register of 1842 and 1843, the name has become singularly inappropriate, since leafy specimens as much as half a meter in height have been gathered in the North-West Himalaya. As a rule the Siberian forms of *T. laxus* have the blade of the staminodes linear-oblong (see fig. 8, *h*), whilst in *T. acaulis* they are usually obovate or obovate-oblong (see 8, *d*, *e*, *f*, *g*); but in the American varieties of *T. laxus*, the nectariferous staminodes are like those of acaulis. As a matter of fact, *T. acaulis* is connected with *T. laxus* by a series of intermediate forms, especially from Gilgit, some of which are hardly distinguishable from the true *T. laxus.* That *T. patulus* and *T. caucasicus* are nothing but varieties of *T. laxus* is pretty generally admitted.

Much importance should not be attributed to the persistence or otherwise of the sepals; they are very commonly so in *T. pumilus*, but the character is not a constant one; the sepals of *T. acaulis* are mostly deciduous, but specimens may be observed in which the head of ripe follicles is accompanied by marcescent sepals The relative length of ovary and style is freely made use of by Ledebour, but the character is of little value, for we find the length of the style in terms of the length of the ovary to be in specimens of *T. asiaticus*—$\frac{2}{5}$, $\frac{1}{2}$, $\frac{1}{4}$, $\frac{3}{5}$.

Remarkable is the close resemblance of *T. lilacinus* to the typical *T. acaulis*; the colour of the sepals of *T. lilacinus* would hardly prevent its being united with *T. laxus*, the more so as the sepals of *T. americanus* are suffused with a pinkish hue on the outside, and in the variety *alba* from the Rocky Mountains they are white. The only character by which it is possible to distinguish *T. clilacinus* from all the other species of *Trollius* is the absence of glandular papillæ on the pistils, a character which, however, is hardly of sufficient value to make it a subspecies as is done by Prantl. We would thus arrive at the following grouping of the various forms of *Trollius*:—

I. Staminodes manifestly thickened at their upper edge, with long claws.—*T. pumilus*, Don.
II. Staminodes quite petaloid, flat at their upper margin, with short claws.

  A. Sepals patulous or spreading:—

    a. Staminodes shorter or somewhat longer than the stamens, obovate or obovate-oblong.
      α. Carpels papillose. Sepals yellow or white.—*T. laxus*, Salisb.
      β. Carpels glabrous. Sepals lilac.—*T. lilacinus*, Bunge.
    b. Staminodes mostly distinctly longer than the stamens, linear or linear oblanceolate or style of a different colour to the ovary.—*T. asiaticus*, Lin.

  B. Sepals connivent, staminodes usually somewhat shorter than the stamens.—*T. europaeus*, Linn.

We now pass on to a more detailed description of the forms which constitute the species *T. pumilus.*

Subspecies.

Subspecies I. ANEMONIFOLIUS, *P. B.*; stem sparsely foliate; blade of basal leaves trilobed to near the base, usually 3—5 cm. long; the segments sub-distant; the middle one deltoid or broadly obovate, breadth $\frac{3}{4}$–$\frac{8}{9}$ the length, nearly to $\frac{1}{2}$ trilobed; lobes lobulate or serrate-crenate, lobules distantly or closely crenate-serrate, serratures apiculate or submucronate; staminodes 6–7 mm. long, linear, breadth about $\frac{2}{9}$—$\frac{1}{8}$ the length. Kansu (*Potanin !*); Tachienlu region (*Pratt* n. 676 !).

Subspecies II. PUMILUS NORMALIS; stem mostly leafless above the base, rarely 1—2-leaved; blade of basal leaves 1—3 cm. long, trilobed beyond the middle or nearly to the base, usually more or less overlapping upwards; middle segment in outline broadly and often subspatulately obovate or broad-deltoid, breadth $\frac{6}{7}$—$\frac{1}{1}$ the length, usually trilobate or subtrifid to $\frac{1}{3}$ or nearly $\frac{1}{2}$; lobes lobulate or subincisedly serrate, serratures mostly frequent and close together, acuminate-mucronate or nearly aristate, rarely apiculate only; lamina of staminodes linear-oblong, often compressed-capitate at the apex, breadth $\frac{1}{4}$—$\frac{2}{5}$ of length.

Subspecies III. GERANIFOLIUS, *P.B.*; stem usually 1- to 2-leaved; petioles of cauline leaves conspicuously sheathing; leaves deeply 3-partite or 3-sect; blade of basal leaves 1—3 cm. long, segments often rather distant; middle segment oblong-elliptic or elongate-deltoid in outline, breadth $\frac{3}{5}$—$\frac{3}{4}$ the length, usually trifid beyond the middle; laciniæ once or twice incised or incised-serrate; lacinulæ or serratures rather scarce, usually lanceolate or lanceolate-linear, apiculate, entire or serrulate; basal sinus usually narrow; staminodes 3—4 mm. long, blade obovate or obovate-oblong, breadth $\frac{1}{4}$—$\frac{1}{3}$ the length.

Subspecies II. PUMILUS NORMALIS.

Var. α. SIKKIMENSIS *P. B.*; leaves with numerous mucronate serratures; flowering stem 8—15 cm. high, leafless or rarely with one leaf near the base.—Sikkim 15—17,000′ (*Hook. fil. !*); Phāri (*K.'s coll. !*); Bhutan, near Kung-met (*K.'s coll. !*).

Var. β. BHOTANICA, *King in herb. Calc.*; stem 30 to 40 cm. high, one-flowered, leafless or rarely with one leaf towards the base; leaves as in *α*.—Chumbi, at Do-tha (*K.'s coll. !*).

Var. γ. YUNNANENSIS, *Franchet Pl. Del.*, *p.* 23; stem up to 50 cm. high, often three-flowered, with one or two cauline leaves; basal leaves as in *α*.—(Yunnan.)

Var. δ. RANUNCULOIDES, *Hemsley pro sp. in Linn. Soc. Journ.*, *No.* 202, *p.* 301; stem 10—24 cm. high, leafless; laciniæ of basal leaves once or scarcely twice serrate, serratures apiculate, segments more or less overlapping, basal sinus closed.—Tachienlu region (*Pratt* !).

Var. ε. KANSUENSIS, *P. B.*; stem 15—20 cm. high; one-leaved near the base; leaf-segments distant, laciniæ once serrate, serratures apiculate.—Kansu (*Potanin*).

Var. ζ. TANGUTICA, *P. B.*; stem 7—10 cm. high, leafless; segments more or less imbricate, lobulate; lobules rounded, once crenate-serrate, serratures scarcely apiculate.—Tangut region of Kansu (*Przwalski !*).

To judge from Don's description, his *T. pumilus* is identical with our subspecies *geranifolius*. Of great interest in connection with the real nature of the so-called petals is the occurrence in var. *bhotanica* of undoubted staminodes, consisting of filaments of varying lengths and an ellipsoidal empty terminal pouch; the number of so-called petals is then reduced to three or four (see fig. 5*d*). This proves conclusively that Prantl's opinion that the nectariferous petals in *Trollius* and other genera of Ranunculaceæ are really modified stamens, is correct. In subsp. *geranifolius* especially the sepals are very often persistent and marcescent (see fig. 6), whilst in *T. acaulis* they are usually caducous; but even in this form persistent sepals are here and there met with, which shows how worthless this character is as a generic, or even specific, mark.

Note—Erase the figure 5 beneath the pistil marked k, mark the pistil in the lower right corner with the letter m, and change the second letter e into l.

Plate 113. *Trollius pumilus*, Don. var. *geranifolius*. 2, leaves of (*a*) *T. pumilus normalis* var. *sikkimensis*, Sikkim; (*b*) ditto from Bhutan; (*c*) var. *kansuensis*; (*d*) var. *tangutica*; (*e*) var. *ranunculoides*, Tachienlu region; (*f*) *T. geranifolius*, var. *connectens*, Sikkim; (*g*) ditto, large-leaved form; (*k*) subsp. *anemonifolius*, Tachienlu region. 3, sepals of *geranifolius*. 4, staminode, stamen, and pistil of *T. pumilus sikkimensis*; 5, staminodes of (*a*) subspecies *normalis sikkimensis*; (*b*), (*c*) subspecies *geranifolius*, Chumbi; (*d*) var. *bhotanica*, Chumbi; (*e*) subspecies *anemonifolius*, Tachienlu; (*f*) subspecies *normalis* var. *ranunculoides*. 6, head of follicles of subsp. *geranifolius*. Seeds 7, (*a*) of *T. pumilus sikkimensis*, (*b*) unripe seed of *T. geranifolius*; (*c*) ripe seed of *T. acaulis*; 8, stamens and staminodes of (*a*) *Trollius americanus*, Mühlb., E. States of N. America; (*b*) ditto, of var. *albiflora*, A. Gray, Rocky Mountains; (*c*) *T. laxus*, Gilgit; (*d*) *T. acaulis*, Kampingra; (*e*) ditto, Kumaon; (*f*) ditto, Chamba; (*g*), ditto Boran pass; (*h*) *T. davuricus*, Turcz. = *T. laxus*, Dahuria; (*i*) *T. lilacinus*, Bge. Ili; (*k*) *T. europaeus*, Germany; (*l*) *T. asiaticus*, Siberia (*Schangin*); (*m*) ditto, apparently from the same locality; (*n*) ditto, Siberia, (*o*) *T. altaicus*, Altai. 9, pistils of (*a*) *T. laxus*, Gilgit; (*b*) *T. americanus*, N. America; (*c*) *T. laxus*, Dahuria; (*d*) *T. laxus*, var. *albiflora* Rocky Mountains; (*e*) *T acaulis typicus*, N.-W. Him.; (*f*) *T. lilacinus*, Bge.; (*g*) *T. asiaticus*, Siberia; (*h*) ditto; (*i*) ditto, Irkutsk; (*k*) ditto, Siberia; (*l*) *T. Ledebourii*, Mongolia; (*m*) *T. chinensis*, Mongolia; (*n*) *T. altaicus* Altai.

Coptis Teeta, *Wall.*

There is little to be added to Wallich's description of this plant in the Transactions of the Medical and Physical Society of Calcutta (vol. VIII). Wallich calls the carpels "breve stipitata," but his follicles were not ripe, and the pistil is always only very shortly stipitate; when ripe the stipes is about as long as the follicle, as seen from fig. 1. The specimens figured on plate 114 were grown in Mr. Mann's garden in Shillong. The Chinese plants are evidently exactly like them.

Plate 114. *Coptis Teeta*, Wall. 1, fruiting specimen; 2, upper part of flowering scape; 3, outermost; 4, innermost sepal; 5 and 6, petals; 7 and 8, stamens; 9, pistil; 10, ripe follicle, part of stipes cut off; 11, seed.

Coptis ospriocarpa, *Paul Brühl.*

Quite glabrous. Rhizome stout-cylindric or subtuberiform, horizontal, covered at the apex with triangular subcarnose scales. Stem slender, erect, 50—80 cm. high (perhaps even higher), terete, striated, solid, 3—4 mm. thick near the base, leafy. Internodes 10—12 cm. long below. Leaves very large, much paler beneath, subtriternatisect, gradually but distinctly decreasing in size upwards; blade deltoidal in outline; nerves slender, more distinct beneath; petiole somewhat shorter than the blade, dilated at the base into a short (1 cm. and less), ovate, membranous sheath, canaliculate on the upper surface, striated (when dry), lower 8—10, uppermost 3—4 cm. long; primary segments ovate-oblong in outline, apparently pinnately divided, rather long petioluled; petiolules slender, middle one about twice as long as the lateral ones, 8 cm. in the lower, 2 cm. in the uppermost leaves; segments of the second order petioluled; middle petiolule in the lower leaves 1·5—3 cm., lateral ones 3—10 mm. long; lateral segments of the second order somewhat oblique, suborbicular or broadly ovate in outline, trisect to trifid or unequally bipartite, terminal partition obovate or rhombic, lateral ones trapezoidal; terminal segment of the second order cordate-ovate in outline, subpinnately cleft; lower divisions nearly to the base, more or less obliquely lanceolate-oblong, upper ones linear-oblong; divisions of the third order pinnately cleft and incised, lacinulæ unequally serrate; serratures callose-apiculate; upper leaves slightly less divided, uppermost often reduced to a small, ovate-lanceolate, very acute scale. Flowers unknown. Infructescence racemose, 20—30 cm. long. Bracts deciduous. Heads of follicles about 6, lower consisting of 3, upper often of 2 or 1 follicle. Peduncles elongating, at first about 5, finally 10—15 mm. long, about 0·7 mm. thick, terete, torus forming a small knob. Follicles stipitate; stipes subterete, striated, thin, finally 10—12 mm. long; follicle proper cylindric, attenuated into the base, terminated by the short persistent style, without stipes 3—4 cm. long, membranous, finely reticulate; sutures narrow, not prominent; persistent style little more than 1 mm. long, stigmatic surface thick, extending along the ventral suture, slightly recurved at the apex, seeds numerous, obovoid.

Eastern Sikkim: at Nūtat; Phari (*Dungbu !*).
Flowers just fallen in July; fruit ripens in August.

This species agrees with *Coptis brachypetala*, Sieb. et Zucc., in the biternately divided leaves with pinnatifid segments, the partitions being again pinnatifid or incised-serrate, the serratures being acute. The authors state, however, that this species has long pedicelled flowers and that "habitus omnino ut in *C. asplenifolia*, DC., sed segmenta foliorum profundius incisa, lobis plerumque augustioribus et minoribus." In our species the lobes are much larger than in *C. asplenifolia*; in fact as regards the vegetative parts it stands nearer *C. Teeta* than *C. asplenifolia*. From both it differs widely in the size and shape of the follicles.

C. anemonæfolia, Sieb. et Zucc., differs in the leaves being ternatisect instead of biternately divided, and the peduncles being twice as long as the fruit.

Indeed, an examination of the figures in Phonzo Zoufou, Vol. VII, proves clearly that our plant does belong to neither *C. anemonæfolia* nor to *C. brachypetala*. It is, however, very closely related to *Coptis orientalis*, Maxim. To judge from Maximowicz's description and Phonzo Zoufou's fig. tab. II versa, which Professor Huth doubtfully refers to *C. orientalis*, the leaves of the two species are nearly identical. A further point of agreement between the two consists in the size of the follicles and the relative length of stipes and follicle proper. Professor Huth states that the follicle of *C. orientalis* is about 30 mm. long of which nearly 10 mm. are accounted for by the stipes. The longest follicles in our species are about 45 mm. long, the stipes being 12—15 mm. The only essential difference between *C. ospriocarpa* and *C. orientalis* rests on the comparative length of fruit and pedicel. Maximowicz lays considerable stress on the relative length of fruit and pedicel. For he says :—"C. anemonæfolia a C. orientali differt pedunculis fructum ad summum duplo, in nostra (C. orientali) triplo quintuplove superantibus.' In *C. ospriocarpa* the longest fruit-bearing pedicels are 17 mm. long, and about one-third the length of a stipitate follicle, but usually they are only $\frac{1}{5}$ or less. *C. orientalis* appears to have five or more carpels in one head. Our species has never more than three. There may, of course, exist other differences in the parts of the flower.

PLATE 115. *Coptis ospriocarpa*, P. Brühl, fruiting specimen from Sikkim; 1, very immature follicle; 2, ovary cut open; 3, seed; 4, scale from below inflorescence.

DELPHINIUM.

Although it may be a matter of convenience to retain *Aconitum* as a separate genus, the characters which distinguish it from *Delphinium* are of so little weight that we cannot help agreeing with Baillon, who unites the two. On the one hand the posterior sepal of the extreme forms of *Aconitum Lycoctonum* is truly spurred, whilst in *Delphinium Hohenackeri* and allied forms it is more helmet-shaped than in many an aconite. The only character which can be used to separate all the forms of *Aconitum* from those of ***Delphinium*** is the existence of a well-developed claw in the nectaries, the claw being never shorter than the cucullus and usually longer; whilst in *Delphinium* it is only indicated and in only a few species is there a distinct rudiment of one. With our present knowledge of *Delphinium* and *Aconitum* it is doubtful whether any botanist could be found who would consent to a generic separation of the two, if they had been originally united. It is certainly as reasonable to establish *consolida* as a separate genus as it is to allow *Aconitum* generic rank. *Delphinium* would then be distinguished from the other *Helleboreae* by its monosymmetric flowers and the form of its nectaries, and it would be divided into the three subgenera—

I.—Consolida; nectaries coherent into one, rarely abortive; carpel solitary.

II.—Delphinium verum; nectariferous staminodes 2, separate, claw absent or rudimentary; carpels 3—8.

III.—Aconitum; nectariferous staminodes 2, separate, claw at least as long as the nectary proper; carpels 3—8.

The arrangement of the species belonging to *Delphinium verum* into sections that leave closely allied forms together, is a matter of great difficulty, and is in some cases impossible. The following classification, to a certain extent foreshadowed by the lamented Professor Prantl in "Die Pflanzenfamilien," is here attempted. A different grouping will, according to a friendly communication of Professor E. Huth, be adopted by him in his monograph on *Delphinium*, which will shortly be published in Engler's Jahrbücher, and which will for a long time to come form the standard work on this highly interesting genus.

Section I.—Delphinellæ; annual; anterior staminodes glabrous; seeds either depressed-spherical, the wrinkles forming an open cup at the top (*Delphinellæ propriæ*), or triangular-subglobose, areolate-rugose (*Staphisagreæ*).

Section II.—Isocheilæ; perennial; anterior staminodes hairy, similar in colour to the sepals, usually about as long as, or longer, rarely (in *D. incanum*) 3 mm. shorter than the anterior sepals, light coloured, usually bifid; seeds lamellate-rugose; cauline leaves usually conspicuously sheathing. To this section belong—*D. dasystachyum*, Boiss.; *D. lanigerum*, Boiss.; *D. ithaburense*, Boiss.; *D. micranthum*, Boiss; *D. hybridum*, Willd., with its subspecies *D. fissum*, Waldst. et Kit., *D. hybridum verum*, *D. cyphoplectrum*, Boiss.; *D. quercetorum*., Boiss. *D. Szowitzianum*, Boiss.; further *D. incanum*, Royle; *D. denudatum*, Wall.; *D. tuberosum* Auch.; *D. penicillatum*, Boiss.; *D. kurdicum*, Boiss.; *D. Zalil*, Aitch. et Hemsl.; *D. saniculaefolium*, Boiss.; *D. uncinatum*, H. f. et T.; *D. dasycaulon*, Fresen.

Section III.—Homœochroæ; perennial; anterior staminodes hairy, similar in colour to the sepals (blue, more rarely purple), distinctly and usually much shorter than the anterior sepals, lamina usually orbicular or oval, entire or bilobed; seeds not lamellate-rugose, sometimes nearly smooth, usually with the epidermis more or less loose, especially along the edges; cauline leaves usually scarcely sheathing. Of Indian *Delphinia* the following belong to this section:—*D. grandiflorum*, Linn., incl. *D. cæruleum*, Jacq.; *D. cheilanthum*, subspecies *schizophyllum*, P. B.; *D. altissimum*, Wall.; *D. pachycentrum*, Hemsl., subsp. *tsangense*, P. B.

Section IV.—Heterochroæ; perennial; anterior staminodes hairy, very different in colour from and shorter than, the (blue, purple, or variegated) sepals, usually purplish-black or chestnut-brown, rarely white or yellow, lamina ovate, usually bifid, with lanceolate-acute segments, rarely roundish and emarginate or bilobed; seeds various; cauline leaves often scarcely sheathing. This is divisible in two subsections, which, when our knowledge of the structure of the seeds has been completed, will probably form two separate sections or series.

Subsection 1.—Pterospermæ; seeds with the loose epidermis forming wings along the edges, epidermis otherwise more or less puckered, but not thrown into scariose wrinkles.—*D. stapeliosmum*, P. B.; *D. elatum*, Linn. subspecies *incisum*; *D. vestitum*, Wall.; *D. viscosum*, H. f. et T.; *D. glaciale*, H. f. et T.; *D. Brunonianum* Royle, *D. densiflorum*, Duthie.

Subsection 2.—Lepidospermæ; seeds lamellate-rugose.—*D. speciosum*, M. Bieb., subspecies *ranunculifolium*, Wall.; *D. kashmirianum*, Royle, and *D. Jacquemontianum*, Camb.

As specimens with ripe fruits are yet rather scarce, partly in consequence of the tendency with paid collectors and amateur botanists to neglect gathering fruits and ripe seeds, partly from the necessity of leaving less accessible regions before the fruits have attained maturity, it is not yet possible to establish in all cases the limits within which the structure of the seed has to be considered as variable. For instance, it would be very interesting to know whether of two species like *Delphinium Brunonianum* and *Delphinium Jacquemontianum*, which agree with each other nearly in every detail, one is a direct offspring of the other, or, what in some respects is more probable, whether they constitute corresponding members of two parallel series, one with its winged seeds a descendent of *D. elatum*, the other a modification of *D. speciosum*. There is no genus among *Ranunculaceæ*, except perhaps *Isopyrum*, where an accurate knowledge of the structure of the seeds is of such importance for a correct discrimination of species as *Delphinium*, including *Aconitum*. Fortunately the collections of Indian plants made since the publication of the first volume of the *Flora of British India* have furnished the writer with sufficient material to settle several doubtful points and to assign to certain forms their right place by making use of characters derived from the seeds. Thus it has been found that *D. ranunculifolium* of Wallich is not a variety of *D. elatum*, but belongs to the group of *D. speciosum*; that *D. Jacquemontianum* cannot be referred to *D. Brunonianum*, but has either to be considered a subspecies of *D. kashmirianum*, or taken as an independent species; that the Khasian forms of *D. altissimum* must be separated from the Himalayan forms and raised to the rank of a species, to which the name of *D. stapeliosmum* has been given by the writer.

But although a detailed and rather laborious investigation has led the author to the conclusion that it is always unsafe to separate or to unite two otherwise closely allied forms unless their seeds be known, too much importance should not be attributed to differences in minute details of their structure. To cite two examples:—*D. divaricatum*., Ledeb., is stated in Boissier's *Flora Orientalis* to have seeds with narrow continuous wrinkles, whilst Hohenacker's specimens from Georgia have seeds with deeply notched, nearly separate scales. *D. rugulosum*, Boiss., is distinguished from *D. persicum*, Boiss., by the seeds of the former having "distinct adpressed scales," whilst the seed-scales of the latter are "abbreviated and united into transverse wrinkles." As a matter of fact the case is sometimes reversed, as an inspection of figs. 11—14 on plate 119 will show, where 11 and 14 are from specimens of the true *D. persicum*, whilst 12 and 13 are from plants which otherwise are good examples of *D. rugulosum*. Drawings of the seeds of practically all the *Delphinia* from the region which is here considered are found on plates 119, 121 and 127. The only Indian species of which the seeds are yet unknown is *D. pachycentrum*, with is more western subspecies *tsangense*; and this belongs very probably to the pterospermous larkspurs. Of no less importance than in *Delphinium* are the seeds in *Aconitum*, a point overlooked by Regel in his excellent enumeration and definition of Russian aconites contained in "Reisen in dem Süden von Ost-sibirien." The seeds of the various species of *Aconitum* are sufficiently well known to utilise them in working out a classification, of which the following is an attempt:—

Section I.—LYCOCTONOIDEÆ. Posterior sepal with a cylindrical, club-shaped, conical or spur-like, protuberance; seeds transversely rugose; flowers yellow, purplish, or red.

Section II.—CAMMAROIDEÆ. Posterior sepal more or less vaulted, sometimes thick-cylindric and incurved; seeds lamellato-rugose; flowers blue or variegated, rarely dark-red, purplish-brown, yellowish or white.

Section III.—NAPELLOIDEÆ. Posteriors epal more or less vaulted, seeds three-sided, pyramidal, more or less winged along the edges, otherwise smooth; flowers usually blue, or variegated, rarely yellow.

EXAMPLES.—I. Lycoctonoideæ: *A. Lycoctonum* with its innumerable varieties.

II. Cammaroideæ: *A. variegatum*, Linn.; *A. paniculatum*, Lam.; *A. Fischeri*, Rchb.; *A. volubile*, Pall.; *A. uncinatum*, Linn.; *A. ferox*, Wall.; *A. luridum*, H. f. et T.; *A. gymnandrum*, Maxim.

III. Napelloideæ: subsection 1.—Napelleæ: sepals deciduous, blue or variegated with white: *A. Napellus*, Linn.

Subsection 2.—Anthoreæ: sepals marcescent, yellow: *A. Anthora*, Linn.

For convenience of reference we append a list of the species of which seeds are figured on the accompanying plates:—

Plate 116, *fig.* 13. *D. uncinatum pseudovestitum.*
Plate 117, *fig.* 10 (a), (b), (c) *D. saniculifolium refractum*; (d) *D. denudatum.*
Plate 118, *fig.* 10. *D. grandiflorum*, (a) var. *paradoxa*, (b) var. *Linnaei*, (c) var. *bhotanica.*
Plate 119, *fig.* 11. *D. persicum*, Shiraz.
12. *D. rugulosum*, Mount Shebo, Beluchistan.
13. *D. rugulosum*, Hari-rud.
14. *D. persicum*, var. *arianense* P.B., Shebo.
15. *D persicum*, var. *Stocksianum*, Beluchistan.
16. *D. persicum*, var. *afghanium*, Afghanistan.
17. *D incanum*, Kashmir.
18. The same.
19. *D. denudatum*, N. W. Him.
20. *D. saniculifolium*, var. *kohatensis*, Kohat.
21. *D. uncinatum*, Hazara.
22. *D. speciosum* Bieb. subsp. *ranunculifolium*, var. *oinophyllum*, Kashmir.
23. *D cashmirianum*, Lahul.
24. *D. Jacquemontianum*, (a) Bashahr, (b) Dhauli valley, Kumaun.
25. *D. Brunonianum*, Kashmir.
26. *D. densiflorum*, Bashahr.
27. *D. viscosum*, Sikkim.
28. *D. vestitum*, N.-W. Him.
29. *D. stapeliosmum*, Khasia.
30. *D. incisum*, Nipal.
31. *D. glaciale*, Sikkim.
32. *D grandiflorum*, war. *bhotanica*, S. E. Tibet.
33. *D. dictyocarpum* (unripe).
34. *D. dasycaulon*, W. Ghats.
Plate 121, *fig.* 10. *D. stapeliosmum*, Khasia.
11. *D. altissimum*, E. Nepal.
12. *D. cheilanthum schizophyllum*, Kumaon.
Plate 122, *fig.* 20. *D. densiflorum*, Lebung pass.
Plate 123, *fig.* 11. *D. viscosum*, Sikkim.
Plate 127, *fig.* 10. *D. speciosum*, subspecies *ranunculifolium*, (a) var. *thyrsantha*; (b) var. *eriantha*; (c) var. *oinophylla.*

We proceed now to the consideration of those species which are figured on plates 116—125, 127, 126.

Delphinium uncinatum, *H. f. et T.*

A perennial herb. Rhizome descending or vertical, subcylindric, 4—8 mm. thick, covered with old leaf-sheaths at the apex. Stem solitary or double, simple or scarcely branched, terete, subflexuose to geniculate, 12—45 cm. high, near the base 2—4 mm. thick, internodes very short near the base, upwards 1—4 cm. long, entirely glabrous or from a glabrescent base upwards densely velvety with spreading hairs of a length of 1—2 mm. Leaves long-petioled, crowded at the base; petioles slender, subcanuliculate, dilated at the base into a lanceolate parallel-veined sheath, two to three times as long as the lamina, glabrous or somewhat hairy; leaf-blade trisect to the base, 1·5 to 6 cm. long, 2·5 to 8 cm. broad, glabrous or villose especially when young; segments cuneate at the base, lateral ones unequally bisect with the external divisions often deeply bipartite, divisions lanceolate in outline, divergent, alternately or suboppositely pinnately incised, laciniæ linear, often ensiform rarely abbreviated, entire or again incised, ultimate lacinulæ callose-apiculate; lower cauline leaves shorter petioled, petioles 2—4 cm. long and sheathing for a shorter distance, blade 3—5-sect, segments linear, entire or sparsely pinnately incised, middle one 1·5—4 cm. long, 1—2 mm. broad. Inflorescence racemose or racemose-paniculate, 10—25 cm. long, lax. Pedicels terete, spreading, straight or scarcely arcuate, 4—6 mm. long, somewhat thickened upwards. Bracts at the base of the pedicels, linear or sublanceolate, acute, like the bracteoles glabrous or hirsute, 4—7 mm. long. Bracteoles linear, basal, lanceolate-linear, about 2 mm. long. Torus depressed, glabrous or hirsute. Sepals bluish, spreading, all glabrous, or the posterior and anterior ones woolly, the lateral ones hairy along the middle on the outer surface; lamina of posterior sepal elliptic, obtuse, 7—12 mm. long, spur saccate or subcapitate at the apex, straight or moderately incurved, horizontal or somewhat ascendent, longer or slightly shorter than the pedicel, 7—10 mm. long, near the apex 1·5—2 mm. thick; lateral sepals oblong-obovate, rounded, entire or subcrenate; anterior ones elliptic-oblong, obtuse, 8—12 mm. long. Lamina of nectariferous staminodes with sigmatoid anterior margin, at the tip shortly bilobed, glabrous or slightly ciliate, 7—10 mm. long; spur open on the inner side to $\frac{1}{3}$ or $\frac{1}{2}$, glabrous or inside minutely hairy, below the open part more or less constricted, capitate at the nearly straight or hooked tip. Anterior staminodes petaloid, lamina oblong, bilobed to about the middle, 6—8 mm. long, villose or shortly hairy on the upper surface, dorsally glabrous or villose, lobes broad-linear, rounded or obtuse at the apex; claw linear, papillose, 4—6 mm. long, shorter than the lamina or equal to it. Stamens about 25, subequal; filaments dilated below, linear, about 5 mm. long, glabrous or sparsely ciliate, nearly filiform near the tip; anthers orbicular. Pistils 3, erect; ovaries oblong; glabrous or hairy, 2·5—3 mm. long; styles nearly straight, stigmatose at the apex, 1—1·5 mm. long, glabrous.

Flowers in June and July.

Var. a. PSEUDOVESTITA *P. B.*; stem, pedicels, sepals velvety with spreading hairs, laciniæ of leaves elongate. Beluchistan (*Stocks.*); Panjab, near Hassan Abdal (*Aitchison!*), and in other localities.

Var. β. AITCHISONI, *Boiss.*; stem, pedicels, sepals velvety; laciniæ of basal leaves more or less abbreviated. Kurrum Valley, near Alikhel (*Aitch.!*).

Var. γ. VICARYI *P. B.*; quite glabrous; laciniæ of basal leaves elongate. Panjab, near Rawal Pindi (*Vicary*); near Hassan Abdal (*Aitchison!*); Afghanistan (*Griffith!*).

PLATE 116. *Delphinium uncinatum*, H. fil. and Th. 1, var. *Vicaryi*; 2, inflorescence of var. *pseudovestita*; 3, young plant of var. *Aitchisoni*; 4, basal leaf of var. *a*; floral details; 5—7 of var. *a*; 8, of var. *γ*; 9, of var. *β*; 10, pedicels: (*a*) and (*d*) *pseudovestita*, (*b*) *Aitchisoni*, (*c*) *Vicaryi*, (*e*) *D. quercetorum*, (*f*) *D. Cyphoplectrum stenophyllum*, (*g*) *D. Cyphoplectrum microphyllum*; 11, nectariferous staminodes of (*a*) *D. Cyphoplectrum stenophyllum*, (*b*) *D. Cyphoplectrum typicum*, (*c*) *D. quercetorum*; 13, seed of *D. uncinatum*, var. *a*.

DELPHINIUM SANICULÆFOLIUM, *Boiss.*

Rhizome thick, fusiform, subtuberous or irregularly stout cylindric; stem erect, flexuose, branched or simple; petioles sheathing; basal leaves subisodiametric, 2·5—4 cm. long, trisect or deeply tripartite with the lateral segments less deeply bipartite, divisions cuneate pinnately cleft and incised, cauline leaves more distinctly tripartite; inflorescence racemose, simple or compound, racemes lax or rather dense; bracteoles inserted near the base of the pedicel; flowers blue; lateral sepals 8–10 mm. long; sepaline spur cylindric or slender conical, symmetric or gibbous, 7—13 (-20) mm. long; anterior nectaries light-coloured, nearly as long as the lateral sepals, bifid, rarely shortly bilobed; pistils 3; follicles cylindric, 8—10 mm. long; seeds broadly obpyramidate rounded, wrinkled with scariose closely imbricate scales.

Flowers in June and July.

Distribution: Persia, Afghanistan, Punjab.

An examination of the numerous specimens of *D. saniculæfolium* in the herbaria of Calcutta and Saharanpur shows of how little importance variations in the form of the spurs of the posterior sepal and of the nectaries are in the group of forms of which *D. hybridum* may be taken as the type. This holds good especially with regard to the gibbosity of the sepaline spur, which is due to an excess of growth of the nectarial spurs which get curved and force part of the sepaline spur outwards. Accordingly we find gibbous spurs in *D. hybridum* and *D. denudatum* and straight or regularly curved spurs in *D. cyphoplectrum* and *D. saniculæfolium.* As the other characters on which Boissier bases the distinction between *D. cyphoplectrum* and *D. hybridum* prove variable, the former has to be reduced to the rank of a subspecies of the latter. To return to *D. saniculæfolium.* The plant collected by Aitchison in the Kurrum Valley, and which Boissier refers as variety *macroplectrum* to *D. penicillatum,* is much more closely allied to the Gilgit forms of *D. saniculæfolium*; and as the name *macroplectrum* ceases to be appropriate, the writer prefers to call it var. *kurrumense*. To the group of *D. saniculæfolium* belong also some plants from Eastern Afghanistan, among them No. 45 of Herb. East Ind. Comp., *D. tuberosum?* They are characterized by their long narrow-cylindrical sepaline, and elongated awl-shaped nectarial spurs. The insufficiency of the material leaves it somewhat doubtful whether this should be united with *D. saniculæfolium,* or considered a separate species To a certain extent it reminds one of some forms of *D. denudatum,* but the seeds are those of *D. saniculæfolium.* It is here described as subspecies *centeteroides.*

The following varieties may be distinguished :—

Subspecies I. VERUM.

Var. a. REFRACTA; branched, glabrous or sparsely hairy; sepaline spur cylindric, gibbous, longer than the lamina; nectarial spurs refracted at the apex; ovaries glabrous.—Southern Persia, Afghanistan.

Var. β. AQUILEGIFOLIA, Boiss.; branched, without glands, glabrous or sparsely hairy; spur attenuated towards the tip.—Northern Persia.

Var. γ. KOHATENSIS, *P. B.*; branched, eglandulose; branches, pedicels, and sepals minutely pubescent with crisp grey hairs; sepaline spur cylindric or conical, slender, straight or recurved, rarely obscurely gibbous at the tip; nectarial spur subulate, straight or recurved; ovaries somewhat hairy near the apex. Afghanistan (*Griffith!*); on dry hills in Kohat and Waziristan (*Drummond, herb. Calc.!*); on dry hills between the Indus and Jhelum (*Fleming*).

Var. δ. GILGITENSIS, *P. B.*; rhizome cylindric or subtuberous; stem simple or somewhat branched, pubescent with crisp hairs; sepaline spur slender, conical, straight or slightly incurved, rarely gibbous; nectarial spurs gibbous below the apex; ovaries covered all over with minute hairs. Gilgit (*Giles!*).

Var. ε. KURRAMENSIS (*D. penicillatum,* var. *macroplectrum,* Boiss.); rhizome subcylindric or tuberous; stem scarcely branched, pubescent with crisp hairs, towards the apex and the pedicels more or less glandulose; sepaline spur straight or slightly curved, slender conical, 10–12 mm. long; nectarial spurs subulate incurved; ovaries sparsely hairy all over. Kurrum Valley (*Aitchison!*); Ziarat (*herb. Sah.!*).

Subspecies II. CENTETEROIDES, P. B.; rhizome subtuberous, stem rather elongate, towards the base glabrescent, upwards sparsely hairy and like the pedicels glandulose; sepaline spur subulate or slender, cylindrical, more or less curved, 15—20 mm. long; nectarial spurs thin, awl-shaped, slightly incurved or recurved; ovaries hairy all over; lamina of anterior staminodes suborbicular, shortly bilobed, disc and base sparsely beset with short hairs, glabrous below; seed-scales rather short, adpressed; leaves of *D. saniculæfolium.* (*Griffith*, Afghanistan, 156 *suppl. list*; *No.* 45, *Herb. East Ind. Comp.*).

D. denudatum, Wall., is very closely allied to *D. saniculifolium*; not only are its sepaline spurs very often gibbous, but even the glandular hairs which are often present on the floral axis of forms of *D. saniculifolium*, sometimes make their appearance in a similar position in specimens of *D. denudatum*. The latter can, however, be always distinguished from the former by the seed-scales being laxly, not closely, imbricate. Some specimens of *D. denudatum* agree nearly exactly with Don's *D. pauciflorum*, which has, according to Don's description, nectarial staminodes like those of *D. denudatum*, and not like those of *D. Ajacis*. The fact that Hamilton suggested *D. consolida* on his sheet has little weight, as various other guesses of his were equally wide of their mark. There would, however, be little use in changing the name of *D. denudatum* after it has obtained the sanction of long usage, the more so as the name of *D. pauciflorum* has been applied by other authors to other species, and is therefore somewhat discredited.

PLATE 117. *Delphinium saniculæfolium*, Boiss. 1, var. *kohatensis*; 2, var. *gilgitensis*; 3, var. *kurrumsis*; 4, pedicels bracteoles, and posterior sepals of a., b. var. *α* from Persia, c. d. var. δ from Gilgit, e. var. γ from Kohat, f. var. γ from E. Afghanistan, g, subspecies II. from E. Afghanistan; 5, nectariferous staminodes of a. b. var. *α*, c. d. var. δ, e. f. var. γ, g. var. ε, h. subspecies II. 6, petaloid staminodes of a. var. *α*, b. var. γ, c. var. δ, d. var. ε, e. subspecies II; 7, stamens of a. var. γ, b. var. ε, c. var. *α*; 8. pistils of a. var. *α*, b. var. ε. Subspecies II, d. var. γ; 9, follicle; 10, seeds of a. var. *α*, bc the same, apical aspect, e. subsp. II, d. of *D. denudatum*.

DELPHINIUM INCANUM, *Royle*.

Rhizome woody, cylindric or subtuberous, descending. Stem erect, branched, terete or more or less angular, in flower 50—120 cm. high, 4—8 mm. thick near base, either wholly canescent with crisp usually downwards directed hairs or glabrescent downwards or rarely upwards densely pubescent with yellow glandular hairs. Branches elongate, spreading or erect-patulous, 10—30 cm. long. Leaves on the lower surface canescent, more rarely puberulous, on the upper surface puberulous or pubescent; lower leaves shortly or long-petioled, upper ones subsessile; the longer petioles moderately dilated at the base, sometimes 5 cm. long; shorter petioles scarcely dilated, strongly striated with parallel nerves; lamina of lower leaves trisect to the base, lateral segments asymmetrically bisect, segments repeatedly pinnatisect, ultimate divisions lanceolate-linear, acute, apiculate, 2—4 mm. broad, nerves prominent beneath; upper cauline leaves smaller than the lower ones, somewhat less divided, lacinulae more acute. Flowers conspicuous, arranged in rather dense racemes. Pedicels at the base with a linear-lanceolate acute bracts of a length of 3—7 mm., 5—15 mm. long in flower, in fruit sometimes 25 mm., shorter than the spur, at or near the base, rarely above the middle, with 2 usually opposite linear bracteoles of the same length as the bract or shorter. Sepals bright blue or purplish, spreading, elliptic or the anterior ones subobovate, 10—18 mm. long, 7—11 mm. broad; anterior and posterior ones very shortly acuminate, outside densely and minutely grey-pubescent, lateral ones rather obtuse and broader, pubescent along the middle; spur about as long as the lamina or $\frac{3}{2}$ as long, horizontal or ascending, subcylindric, more rarely subulate, straight or somewhat curved, at the tip obtuse or subacute or abruptly narrowed, often narrower in the middle. Nectariferous staminodes shorter than the sepals, glabrous, anterior margin upwards bent back at nearly a right angle, bilobed or subentire at the apex; spur straight or curved, subuate. Petaloid staminodes nearly as long as the sepals, sometimes 3 mm. shorter; lamina asymmetrically ovate, bifid to about the middle, on the upper surface near the base bearded with white hairs, often subciliate, glabrous or little hairy on the back; claw linear, a little shorter than the lamina, papillose at the edges. Stamens 40—50, about half as long as the sepals, exterior ones a little longer; filaments moderately dilated near the base, glabrous; anthers subrotund. Pistils 3, erect, 3—4 mm. long; ovaries ovate-oblong, densely and minutely pubescent; style filiform, nearly half as long as the ovary, glabrous upwards, stigma shortly bilobed. Follicles 3, on erect or patulous pedicels, chartaceous, ovoid-cylindric, reticulate, 10—12 mm. long, beset with stiffish straight or more commonly with crisp minute hairs, persistent style $\frac{1}{3}$—$\frac{1}{2}$ the length of the follicle. Seeds numerous, obpyramidate, 3—4-sided, dorsal side broader and slightly curved, covered with scariose free or slightly connate subadpressed scales, about 1·5 mm. long.

Flowers from June to September.

Kashmir (*Herb. Falc.!*); Sind valley (*Stoliczka! Clarke!*); Kishenganga valley near Gurais (*Duthie!*); Liddar valley 8—9,000′ (*Duthie!*); Pangi (*Stoliczka!*); Kunāwar (*Royle!*); Bashahr (*Lace!*).

Delphinium incanum is the Himalayan development of the polymorphous *D. hybridum*; especially close is the affinity between a rather small-flowered form from Kunāwar with purplish-blue sepals and petaloid staminodes as long as, or longer than the lateral sepals, and the laxer racemose variety of *D. puniceum* from the Caucasus. The middle cauline leaves of *D. incanum* are, however, always subsessile, the sheaths of the petioles much less conspicuous, the sepals are broad-elliptic instead of elliptic-oblong and usually larger, and the petaloid staminodes are commonly distinctly shorter (1—3 mm.) than the lateral sepals.

PLATE 119. *Delphinium incanum*, Royle. 1, upper part of flowering plant; 2, basal leaf; 3, posterior sepals, (*a*) Kashmir, (*b*) Kunawar; 4, lateral sepal; 5, anterior sepal; 6, nectariferous staminode; 7, petaloid staminode; 8, stamen; 9, (*a*) pedicel with carpels, (*b*) pistil, (*c*) hair; 10, mature carpel. Hairs similar to 9 (*c*) occur on the floral axis of *D. hybridum*, *D. cyphoplectrum*, *D. dasycaulon*, *D. grandiflorum*, *D. speciosum*, and others.

DELPHINIUM GRANDIFLORUM, *Linn.*

(*Delphinium grandiflorum*, Linn.; *D. cæruleum*, Jacquem; *D. longipes*, Franchet = *D. Davidi*, Franchet; *D. Kumaonense*, E. Huth).

Perennial; rhizome subcylindric; flowering stem 7—60 cm. high; leaves trisect or deeply tripartite, lateral segments 2 to 3-partite, divisions variously cleft and incised, lacinulae linear or linear-lanceolate or oblong, more rarely obovate or obovate-oblong; inflorescence rarely one-flowered, usually several- to many-flowered, paniculate or paniculate-corymbose; bracteoles usually above the middle of the puberulous or villose pedicles; sepals spreading, 12—15 mm. long, blue, more rarely purple, white, or greenish; sepaline spur slender conical; staminodes shorter than the sepals; lamina of anterior staminodes blue or purple, orbicular, obovate or obovate-oblong, subentire, emarginate, to bilobed beyond the middle; pistils 3—9; follicles 12—18 mm. long; seeds obpyramidal or oblong, 3—4-sided, testa more or less loose, folded into wings along the edges and more or less puckered on the sides.

Flowers about July and August.

Distribution: Siberia, China, Himalaya.

Delphinium grandiflorum, (incl. *D. cæruleum*,) is represented by numerous specimens in the herbaria of Calcutta and Saharanpur, not only from Kumaon, Sikkim, and Chumbi, but also from Siberia and various parts of China. It has consequently been possible to trace in detail the gradual transitions between the many varieties which, however much the extreme forms may differ from each other, constitute one uninterrupted series. The most important links are formed by varieties from Mongolia and South-Eastern Tibet, the invasion of the Himalaya by *D. grandiflorum* having evidently taken place from the side of Central and Eastern Tibet. None of the characters by which *D. cæruleum* has been supposed to be distinguished from *D. grandiflorum* proves constant on detailed examination, as will be seen from the description of the varieties of *D. grandiflorum* to which we now proceed.

Var. α. LATISECTA, *Maxim.*; stem erect, middle-sized or elongate (15—80 cm.), much branched; laciniæ of leaves ovate or oftener lanceolate, acute or obtuse; sepals minutely pubescent, azure; follicles 3, recurved nearly from the middle.—Sechuan, Kansu.

Var. β. CHINENSIS, *Fischer*; tall, erect, rather rigid; laciniæ broad-linear; bracteoles minute linear, somewhat remote from flower; sepals minutely pubescent outside; lamina of anterior staminodes suborbicular, entire, glabrous on back and edges; carpels 3.—Siberia, China.

Var. γ. PUBIFLORA, *Turcz.*; stem prostrate, like peduncles and sepals densely minutely pubescent; laciniæ elongate, narrow-linear; anterior staminodes suborbicular, entire.—Baical region.

Var. δ. LINNÆI; stem tall, erect, like peduncles and sepals minutely crisp-pubescent; laciniæ narrow-linear, elongate; bracteoles linear, small, more or less remote from flower; lamina of anterior staminodes suborbicular, entire or emarginate, glabrous below, sometimes ciliate; carpels 3 (—4); follicles straight or recurved at the apex.—Siberia, Mongolia, Northern and Central China proper, Yarkand.

Var. ε. POTANINI, *P. B.*; as in δ, but lamina of anterior staminodes obovate-oblong, emarginate or bilobed, ciliate, more or less hairy below; sepals outside near the base minutely pubescent or sub-villose.—Setchwan (*Potanin !*).

Var. ζ. KUMAONENSIS, *E. Huth*; stem erect, subglabrous, 40—60 cm. high, 3—4 mm. thick near base; leaves 3-partite, middle division 3-fid, lateral ones divided into 3 or more segments, laciniæ broad-linear, the longer ones sometimes 2 cm. long by 2 mm. broad; inflorescence racemose-paniculate, many-flowered; pedicels villous; bracteoles small, linear remote from flower; sepals 11—18 mm. long, sky-blue, villous outside; lamina of anterior staminodes suborbicular, subentire or deeply bilobed, yellow-bearded, blue; carpels 3.—Kumaon: Byāus, near Kutti 13—14,000′ (*Duthie !*); Dārma, in the Nipchang valley 13—14,000′ (*Duthie !*); on Mulapa Gādh 11—12,000′ feet (*Duthie !*); Nipal; on Nampa Gādh, 10—11,000′ (*Duthie !*).

Var. η. TENUICAULIS, *P. B.*; stem very slender (30—50 cm. high, 1—1·5 mm. thick), sparsely beset with retrorse hairs; leaves remote, moderately cut, laciniæ lanceolate-linear, subobtuse, the longer ones 15—35 mm. long, 2—3 mm. broad; inflorescence racemose, very lax, few-flowered; bracteoles linear, remote from the flowers; peduncles and sepals covered with short hairs; sepals blue or purple; lamina of anterior staminodes obovate-oblong, bilobed or nearly bifid, hirsute on upper surface, rarely nearly bearded; carpels 3.—Chumbi: near Phēmū and Rinchingong (*King's collectors !*).

Var. θ. DAVIDI, *Franchet pro sp.*; middle-sized, hispidulous with longish adpressed or spreading hairs; stems slender, ascending; laciniæ of upper leaves linear; flowers solitary or subcorymbose; peduncles shortly retrorse-pubescent; sepals puberulous; anterior staminodes oblong, bilobed, near the base yellow-bearded; carpels 3 (?).—Tibet, prov. Mūpin.

Var. ι. SETCHWANENSIS, *P. B.*; a small slender plant, scarcely branched; stem and peduncles retrorse-pilose, indumentum below the sparsely hairy sepals rather longer; laciniæ linear-lanceolate; bracteoles elliptic-oblong, opposite, just below the sepals; lamina of anterior staminodes ovate-oblong, deeply bilobed, slightly hairy; carpels 3.—Setchwan (*Henry !*). This variety, like δ, μ, ζ and others, might be considered a species of the second order.

Var. κ. KUNAWARENSIS (= *D. cæruleum* of Jacquemont); stem 30—50 cm. high, 3—5 mm. thick; leaves little or not crowded near the base, much divided; laciniæ linear, acute or subacute, 5—20 mm. long, 1—2 mm. broad; inflorescence paniculate-corymbose, many-flowered; bracteoles alternate, small, linear, remote from flower; sepals villous near the base, azure, 12—15 mm. long, lamina of anterior staminodes suborbicular, entire or emarginate, yellow-bearded; carpels 5.—N.-W. Himalaya.

Var. λ. BHOTANICA, *P. B.*; stem 15—50 cm. high, 1·5—5 mm. thick near base; laciniæ linear, acute, or subacute, 5—20 mm. long, 1—2 mm. broad; inflorescence ample, paniculate-subcorymbose, many-flowered; bracteoles alternate, small, linear, remote from flower; sepals villous near the base, 16—25 mm. long, blue or purple; lamina of anterior staminodes suborbicular or rounded-subquadrate, more rarely obovate-oblong, entire, emarginate, or shortly bilobed, yellow-bearded; carpels 5.—Bhūtān, near Ta-lū-ny; Chumbi and Phāri (*King's collectors!*).

Var. μ. PARADOXA, *P. B.*; flowering plant 15—20 cm. high; leaves more or less crowded near the base, trisect, segments variously cleft, laciniæ abbreviated lanceolate, lacinulæ oblong or cuneate-obovate 1·5—8 mm. long, 1—2 mm. broad, usually rather obtuse; flowers 1—3; peduncles 8—12 cm. long, ebracteate or bibracteate, bracts oblong-lanceolate entire or conform to the leaves; sepals subhirsute, outside yellowish green, inside white; lamina of anterior staminodes subelliptic, shortly bilobed, yellow-bearded; carpels 3; seeds blackish, narrow-winged.—Chumbi; Tah Tsong (*King's collectors!*).

Var. ν. OBTUSILOBA, *P. B.*; flowering plant usually 6—15, rarely 30 cm. high; stem branched from the very base; leaves rather crowded near base, much cut, densely pubescent; lacinulæ linear-oblong or oblong-obovate, very rarely linear, obtuse, rarely subacute; inflorescence subcorymbose, two to many-flowered, rarely flowers solitary; bracteoles remote from flower, lanceolate or oblanceolate or sublinear; sepals densely villous near base, with yellow hairs, inside sky-blue or purple; lamina of anterior staminodes suborbicular, entire or emarginate, yellow-bearded; carpels 5.—Chumbi and Phāri: near Gūp, Ting, Phāri, Giagong, Cha-kung-la (*King's collectors!*).

Var. ζ. TSANGENSIS, *P. B.*; small, branched herb; stem, peduncles, and azure sepals minutely and sparsely pubescent; leaves subglabrous; laciniæ of basal leaves abbreviated, of upper leaves linear; flowering branches slender; bracts 2, alternate, linear, more or less remote from flower, lower one often 1—2 cm. long; lamina of anterior staminodes suborbicular, crenulate, yellow-bearded; carpels 5.—Tibet, between northern frontier of Sikkim and Lhassa (*King's collectors!*).

PLATE 118. *Delphinium grandiflorum*, Linn. 1, var. η *tenuicaulis*; 2, var. ν *obtusiloba*; 3, var. o, *tsangensis*; 4, posterior and lateral sepal of var. *Kumaonensis*, Kumaon; 5, the same of var. *pubiflora* Turcz., Baikal region; 6, petaloid staminodes (lateral petals): a. var. *Linnaei*, Yarkand; b. var. *obtusiloba* Chumbi; c. var. *Linnaei*, Siberia; d. var *bhotanica*, Phari; e. var. *Kumaonensis*, West Nipal; f. var. *Potanini*, Setshwan; g. the same; h. var. *setshwanesis*, Setsshwan; i. var. *tsangensis*, S.-E. Tibet; k. var. *tenuicaules*, Sikkim; l. var. *paradoxa*; 7 stamens; a. var. *paradoxa*; b. var. *setwshanensis*, c. var. *tsangensis*; d. var. *Potanini*; 8, gynoecium; a. var. *Kumaonensis*; b. var. *bhotanica*; c var. *paradoxa*; d. var. *tsangensis*; 9, stigma of var. *tsangensis*; 10 seeds; a. var. *paradoxa*; b. var. *Linnaei* c. var. *bhotanica*; 11 upper part of pedical; a. var. *bhotanica*; b. var. *Kumaonensis*; c. var. *Potanini*; d. var. *typica*; e. var. *tsangensis*.

DELPHINIUM CHEILANTHUM, *Linn.*, *subsp.* SCHIZOPHYLLUM, *P. B.*

This plant was gathered by Col. Davidson on the China hill near Naini Tal. It is here referred to in order to draw the attention of Indian botanists to this interesting form, which establishes another link between the flora of the Western Himalaya and that of Siberia. It is marked *D. elatum* on the label, and probably has not been specially noticed before, because field botanists have mistaken it for a form of that species. The petaloid staminodes are, however, blue, and their lamina is suborbicular and emarginate, exactly as in *D. glandiflorum* and *D. cheilanthum*. From all the varieties of the former it differs by the shape and the mode of division of its leaves, in which respects it agrees much more closely with *D. cheilanthum*. Whether it may ultimately prove a species of the first order further observation must show. We consider it at present a subspecies of *D. cheilanthum*, with which we unite also Trautvetter's *D. Middendorffii*. We have thus—

Subspecies I. CHEILANTHUM VERUM; stem glabrous; inferior leaves trisect, lateral segments again 2- or even 4-sect or partite; segments divergent, rhombic or rhombeo-oblong in outline, trifid, laciniæ incised; upper ones 3- to 5-sect, segments subentire; petaloid staminodes suborbicular, quite entire or shortly bilobed; follicles reticulate.—Siberia.

Subspecies II. MIDDENDORFFII, *Trautv.*; stem glabrous; leaves finely pubescent or glabrous beneath; basal ones deeply tripartite, lateral segments again bipartite; all segments divergent, obovate-cuneate, tri- or bifid; segments of cauline leaves rhombeo-lanceolate in outline, deeply cleft, laciniæ linear; petioles shortly sheathing; pedicels patulous; lamina of petaloid staminodes obovate; sepals elliptic-oblong.—Siberia, Northern Mongolia.

Subspecies III. SCHIZOPHYLLUM, *P. B.*; tall, erect, glabrescent; leaves sparsely pubescent, dark-green above, pale beneath; lower cauline leaves deeply tripartite, lateral segments very broad, about 4-partite; partitions and middle segment overlapping, rhombic, laciniæ broadly linear or lanceolate, deeply incised and sparsely serrate, lacinulæ lanceolate to lanceolate-linear; upper cauline leaves less frequently divided, the ultimate segments very long and linear, acute; inflorescence racemose compound below, lax; bracts trisect below, lanceolate upwards; pedicels erect, recurved and pubescent at the tip, elongating after flowering, lower ones 5—6 cm. long; bracteoles lanceolate-subulate, a little below the flower; sepals bright blue, broadly elliptic, about 18 mm. long, lateral ones about 15 mm. broad; spur longer than lamina; staminodes shorter than the sepals; lamina of petaloid staminode suborbicular, emarginate, yellow-bearded near the base; pistils 3; ovaries hairy; follicles cylindric, about 22 mm. long; seeds rounded obpyramidal, large; testa much puckered, more or less folded up along the edges.—Kumaon.

PLATE 121, *fig.* 19. Seed of *Delphinium cheilanthum*, Linn., subsp. *schizophyllum.*

DELPHINIUM DICTYOCARPUM, *DC.*

Perennial; stem tall, 3—5 mm. thick near base; leaves subcoriaceous, deeply tripartite, with the lateral segments 2—3-partite; inner divisions lanceolate or acutely deltoid in outline, all of them pinnately cleft and incised, lacinulæ broad- or narrow-lanceolate; petioles somewhat dilated at the base; inflorescence racemose-paniculate or racemose, very lax or rather dense; sepals blue; anterior staminodes shorter than the sepals, blue, rarely pale purple; lamina ovate shortly bilobed or subbifid, yellow-bearded about the middle; carpels 3; seeds obpyramidate, narrow-winged along the edges.

Distribution.—Altai; Setchwan; Tsang.

Subspecies I. LAXIFLORUM, *DC. pro sp.*; sepals 20—25 mm. long; anterior staminodes ½ to ⅓ the length of the sepals, sparsely ciliate with short yellow bristles; ovaries and follicles pubescent with dense crisp hairs.—Altai; Setchwan or Eastern Tibet.

Subspecies II. DICTYOCARPUM PROPRIUM; sepals 11—15 mm. long; anterior staminodes villose-ciliate with white hairs; ovaries sparsely pilose or densely pubescent.—Altai.

Subspicies III. TIBETICUM, *P. B.*; sepals 12—18 mm. long; anterior staminodes ⅔ the length of the sepals, shortly bilobed, villose-ciliate with white hairs; ovaries densely pubescent; inflorescence subdensely racemose.—Southern Tibet, between the northern frontier of Sikhim and Lhassa.

Var. a. GLANDULOSUM, *P. B.*; floral axis and pedicels glandular hairy.

Var. β. CINEREUM, *P. B.*; floral axis and pedicels densely pubescent with short soft grey hairs (*indumentum like that of the floral axis of the ordinary form of* D. incanum). This is probably the *Delphinium* referred to by Hooker and Thomson in the Flora of Br. Ind. in the words:

"Fragments of a *Delphinium* closely allied to *D. incanum* were brought by Dr. Hooker from Tibet, north of Sikkim; it differs from *incanum* in the slightly notched petals, and may be new."

PLATE 119, *fig.* 33. Seed of *Delphinium dictyocarpum*, DC.

DELPHINIUM ALTISSIMUM, *Wall.*

The great resemblance which the vegetative parts of the Khasian larkspurs bear to those of Wallich's *D. altissimum* has induced botanists to refer them to the latter species. It is true that the inflorescence of the Khasian plant is much opener, that the colour of the staminodes is dark-blue instead of light-purple, and that Wallich omits to make any remark about the odour of the flowers, which in the Khasian plants are fetid like those of a *Stapelia*; but these characters may be considered of minor importance and not sufficient to separate two form-groups as species. Recently, however, Dr. King's collectors have gathered fruiting specimens near the Nipal frontier, and we know now that the seeds of *D. altissimum* are very different from those of the Khasian *Delphinium*. The latter has the seeds of *D. grandiflorum* and *D. elatum*, where the lightbrown epidermis is thrown into wing like folds along the edges of the obpyramidate seed and becomes more or less puckered on the dorsal and ventral surfaces (see plate 121, figures 10, *a*, *b*, *c*); on the other hand, the seed of *D. altissimum* is obovoid, has a brownish-black testa, and although obscurely wrinkled it is neither winged nor scaly, and therefore constitutes, as far as larkspurs go, a distinct type of seed (see plate 121, fig. 11 *a*, *b*). The cells of the epidermis are much larger in the Khasian plant (plate 121, fig. 10 *a*) than in *D. altissimum* (ibidem, fig. 11 *c*). The Khasian plant will therefore be described under the name *D. stapeliosmum.*

There is comparatively little to be added to Wallich's description of *D. altissimum* in the second volume of his *Plant. As. Rariores*: the few additions concern the seed and the remarkable form defined below as subspecies *drepanocentrum.* Regel reports *D. altissimum* from Turkestan; but, in the absence of specimens from that country, and in consequence of Regel not mentioning the colour of the staminodes or the structure of the seeds, the writer is unable to say whether the Turkestan specimens are referable to *D. altissimum*, or whether they may not be a variety of *D. ranunculifolium*, Wall., Indian specimens of which might often easily be confounded with *D. altissimum.*

The Indian forms may be grouped as follows:—

D. ALTISSIMUM, *Wall.*, a tall perennial herb; stem glabrescent below or densely hirsute from the base; lower leaves very long-petioled, blade reniform or subisodiametric, much paler below, deeply tripartite, lateral segments unequally 2—3- lobed, segments and lobes trifid, crenate-serrate; inflorescence racemose or racemose-paniculate; racemes elongate, many-flowered, lax or rather dense, spur as long as, or longer than, the sepals; sepals blue; staminodes shorter than the sepals, light-purple, blade of petaloid staminodes shortly bilobed, hairy; follicles 3, patulous, subcylindric, about 1·5 cm. long; seeds obovoid, brownish black, obscurely wrinkled, neither winged nor scaly.

Subspecies I. WALLICHII; stem upwards pubescent with fine crisped colourless hairs; upper surface of leaves rather sparsely covered with adpressed hairs, nearly glabrous beneath except the nerves; spur little longer than the sepals, nearly straight or gently recurved; ovaries ciliate on the ventral suture, otherwise glabrous or sparsely and finely pubescent.

Var. α. NIPALENSIS, *P. B.*; bracteoles remote from the flower, small, lanceolate; sepaline spur straight or slightly incurved.—Nipal (*Wall. !*). This is probably Don's *D. Carela.*

Var. β. PHALLUTENSIS, *P. B.*; bracteoles close to the flower, rather conspicuous, linear; sepaline spur often slightly recurved.—Sikkim: near Sikangam 12,000′; Subikūng, Phullut (*King's collectors !*).—Flowers in August.

Subspecies II. DREPANOCENTRUM, *P. B.*; a middle-sized herb; the whole stem covered with dirty-yellow more or less deflexed, partly glandular hairs; blade of leaves hairy above, subhirsute beneath; bracteoles close to the flower, linear; sepaline spur distinctly longer than the sepals, sickle-shaped; ovaries hirsute.—Western Sikkim, near Wallanchūn (*King's collectors !*). Flowers in August and September.

PLATE 120. *Delphinium altissimum*, Wall. 1, part of infructescence of var. *phallutensis*; 2, (on the right) nectariferous taminode of the same; 3, pistil of var. *nipalensis*; 4, the same of var. *phallutensis*; 5, ditto of subspecies *drepanocentrum*; 6—9 staminodes; 6, of var. *phallutensis*; 7—9, of *D. drepanocentrum*; 10—13, refer to *D. drepanocentrum*; 10, lateral sepal; 11, posterior sepal, 12, (2 on the left) nectariferous staminode; 13, stamen; 14, ripe follicle of var. *phallutensis*

PLATE 121, *fig.* 11. Seed of *Delphinium altiesimum* Wall.

DELPHINIUM STAPELIOSMUM, *P. Brühl.*

(*D. altissimum, H. f. et T. in the Flora of Br. India as to the Khasian specimems.*)

Stem erect (40—) 70—150 cm. high, branched, beset with stiff retrorse hairs especially upwards; leaves very pale below, reniform or suborbicular, cordate, more or less deeply tripartite, lateral segments trapezoidal unequally bilobed, all divisions very coarsely serrate; inflorescence a very lax large subracemose panicle; peduncles suberect, lower ones up to 10 cm. long; bracteoles nearly always alternate, inserted at varying heights; flowers fetid; sepals deep-blue or purple; sepaline spur subulate, 1—5 mm. longer than the lamina; anterior staminodes much shorter than the sepals, very dark-blue, ovate, bifid or subbilobed, yellow-bearded; ovaries densely hairy; follicles 3, cylindric, 13—20 mm. long; seeds obpyramidate, subtriangular in cross-section, conspicuously winged along the edges, puckered on the sides, epidermal cells very large and irregular.

Flowers in September and October.

Distribution: Khasia; Shān Hills.

From the true *D. altissimum* of Wallich the present species differs by its inflorescence, which in *D. altissimum* is much more distinctly racemose; by the bluish-black (not light-purple) anterior staminodes, its fetid flowers, and especially by its seeds (compare plate 121, figs. 10 *a*, *b*, *c*, *d* with figs. 11 *a*, *b*, *c*).

Var. a. KHASIANA, *P. B.*; leaves more or less deeply palmatipartite, coarsely serrate.—Khasia 5-6,000′ (*Herb. Calc.!*).

Var. β. SHANICA, *P. B.*; leaves 5-lobed scarcely to the middle, coarsely dentato-crenate; inflorescence an exceedingly large panicle; flowers often more distinctly racemose.—Shan Hills, 4—5,000′ (*Collett.!*).

PLATE 121. *Delphinium stapeliosmum*, P. Brühl. 1, an exceptionally small-sized flowering plant from *Khasia*; 2. extremity of axis with head of follicles, from a tall specimen, *Khasia*; 3, part of upper lateral branch of var. *shanica*, Shan Hills; 4, nectariferous staminode; 5, petaloid staminode; 6, basal portion of petaloid staminode; 7, stamen; 8, gynœcium; 9, stigmatose part of style; 10, seed of *D. stapeliosmum*: (*a*) dorsal, (*b*) ventral aspect, (*c*) cross-section through upper half, (*d*) epidermis; 11, seed of *D. altissimum*, Wall., Phullut: (*a*) dorsal aspect, (*b*) cross-section;. 12, seed of *D* *cheilanthum*, subspecies *schizophyllum*, China Hill, Garhwal.

DELPHINIUM DENSIFLORUM, *Duthic.*

(*Plants of Kumaon No.* 2677; *D. Brunonianum*, var. *densa*, Maxim. *in Flora Tangutica.*)

A perennial, middle-sized herb. Rhizome descending, subcylindric, 3—5 mm. thick. Stem erect, strict, simple or scarcely branched, subcylindric, striated, fistulose, 30—50 cm. high, 6—10 mm. thick near the base, glabrescent below, upwards beset with white partly crisp retrorse hairs partly villose with longer spreading hairs often mixed with yellow glandular hairs. Lower leaves very long-petioled; petioles gradually dilated near the base, 5—18 cm. long, somewhat hairy; lamina reniform, at the base cordate, 3-partite to $\frac{2}{3}$, 3·5—6 cm. long, 6—10 cm. broad, beneath paler, puberulous or subvillous; middle segment cuneate-obovate, trifid upwards, lateral segments trapezoidal, 3—4-lobed; lobules serrate-crenate, serratures callose-apiculate; upper leaves gradually decreasing in size and simpler with woolly petioles; lower floral leaves shortly petioled, subtruncate at the base or with a wide triangular sinus, palmately tripartite, divisions serrately incised and crenate-serrate; intermediate floral leaves petiolate or sessile, cuneate, 3- or 2-fid, dorsally woolly near the base, laciniæ quite entire or sparsely serrate; uppermost leaves lanceolate or lanceolate-linear, attenuated towards the base; narrowed upwards, 1·5—2·5 cm. long, sometimes glandulose. Inflorescence racemose, very dense. Peduncles erect, strict, terete or sub-angular, lanate, lower 4—5, uppermost 1·5—2 cm. long, 1—2 mm. thick, bibracteolate at the middle or near the top. Bracteoles opposite, sessile, adpressed, linear, narrowed upwards, callose-apiculate, 10—15 mm. long, 2—4 mm. wide near base, hairy on the back, ciliate. Sepals patulous, outside greyish-blue with blue nerves or entirely sky-blue, concave, short-acuminate, sublanate outside, ciliate, inside hairy along the nerves; lamina of posterior sepal 2—2·5 cm. long, broad-elliptic; spur either subsaccate, obtuse, about 6 mm. long, 3—4 mm. thick near base, or conical, subacute, 12—15 mm. long; lateral sepals suborbicular, 16—20 mm. long. Lamina of nectariferous staminodes asymmetrically spatulate, at the apex bilobed or emarginate, 12—15 mm. long, below 1·5—2 mm., near the apex 2—5 mm. broad, glabrous or on the inner side of the broader top hairy, or at the tip yellow-bearded; spur slender-conical, acute, subincurved, inside open to about one-third and here glabrous or minutely hairy. Petaloid staminodes with an ovate or obovate bifid lamina, which is 6—7 mm. long, on the upper surface rather densely hairy, near the base somewhat bearded with yellow or white hairs, ciliate, dorsally hairy; lobes divergent ovate-oblong, subacute (sometimes the lamina is bilobed and erose or unequally trifid); claw linear, at least as long as the lamina, dorsally somewhat hairy. Stamens moderately numerous, 5—9 mm. long, innermost by about 1 mm. shorter, glabrous; filaments dilated towards the base; anthers ellipsoidal, obscurely apiculate, about 0·8 mm. long. Pistils 3, erect, 4—5 mm.; ovaries ovoid-oblong, reticulate, 3 mm. long, glabrous, or glabrous dorsally, ventrally minute-pubescent, or densely pubescent all over; style filiform. Ovules about 20. Follicles 3, membranceous, erect, cylindric, obliquely subtruncate at the rounded tip, 11—12 mm. long, white-villose, style 3 mm. Seeds obpyramidal, about 2 mm. long, brown, winged with the loose testa.

Flowers in August and September.

Var. α. PLATYCENTRA, *P. B.*; spur about 6 mm. long, subsaccate, sepals greyish-blue.—Kumaon: Rālem pass 15—17,000′ (*Duthie!*), in the Lebung pass 16—17,000′ (*Duthie!*); Tangut region, near Amdo (*Maxim.*)

Var. β. STENOCENTRA, *P. B.*; spur 12—15 mm. long, conical, sepals sky-blue.—Bashahr, 14,000′ (*Watt!*).

D. densiflorum, Duthie, is very closely allied to *D. Brunonianum*, with which it has the shape of leaves and flowers, as also the seeds in common Characteristic is its exceedingly dense inflorescence due to the pedicels being strictly erect. Mr. Duthie also tells the writer that, as far as he can remember, the flowers have not the odour of musk, in this respect therefore resembling *D. kashmirianum*. It may be pointed out here that *D. Jacquemontianum* is not reducible to *D. Brunonianum*, however great the resemblance between the two may be; for *D. Jacquemontianum* has not only dark-blue staminodes—a character perhaps not of much moment—but it has the scaly seeds of *D. kashmirianum*, whilst the true *D. Brunonianum* has the seeds of *D. elatum*. Considering that the flowers of Kashmirian specimens of *D. ranunculifolium*, which we take to be a subspecies of *D. speciosum*, are often not so very different from the more acutely spurred flowers of some forms of *D. kashmirianum*, it is quite possible that *kashmirianum* and *Jacquemontianum* are descendants of *D. speciosum*, whilst *D. Brunonianum* may come from a common stock with *D. elatum*. If we deny specific value to glandular hairs and the absence or presence of a musky odour, we will have to regard *D. Jacquemontianum* as a subspecies of *D. kashmirianum*, but it cannot be united with *D. Brunonianum*.

PLATE 122. *Delphinium densiflorum*, Duthie; 1, var. *platycentra*; 2, bract; 3, bracteole; 4, posterior sepal; 5, lateral; 6, anterior sepal; 7—8, nectariferous staminodes; 9, 10, 11, petaloid staminodes; 12, 13, the same; 14, stamens; 15, anther; 16, gynoecium; 17, pistils; 18, ovary, opened, partly cut away; 19, ripe follicle; 20, seed.

DELPHINIUM VISCOSUM, *H. f. et T.*

An examination of the rich material collected under the direction of Dr. King proves this species to be rather polymorphous; and if it were not for the existence of intermediate forms it would be possible to split it up into two or three tolerably well-defined species. Particularly variable is the indumentum of the ovaries; but a critical study of this character leads to the conclusion that, here as everywhere, the indumentum even of the carpels is only a feeble peg to suspend a species from.

The following are the varieties of *D. viscosum* which may at present be distinguished:—

Var. α. CHRYSOTRICHA, *P. B.*; middle-sized; leaves deeply trilobate, the lateral lobes lobulate; inflorescence usually few-flowered; bracts, bracteoles, and upper surface of leaves densely clothed with soft adpressed greenish-golden hairs; bracts conspicuous, more or less like the leaves; bracteoles elliptic oblong or oblong-lanceolate, sometimes three-notched or trifid at the apex; spur subconical, scarcely or distinctly shorter than the silky sepals; ovaries silky.—Eastern Nipal: near Kanglanamo and Nirpokri 13,000′ (*King's collectors!*); Sikkim: in the Jongri district (*King's collectors!*).

Var. β. CILIATA, *P. B.*; a middle-sized or rather tall herb; leaves deeply sub-5-lobed, scarcely hairy above; inflorescence of one or a few flowers; bracts conspicuous, sepals subvillose with yellow or white hairs; spur conical or subcylindric, often quite as long as the sepals; ovaries ciliate along the ventral suture, otherwise glabrous, rarely entirely without hairs.—Sikkim, 15—16,000′ (*H. f. et T.!*), Western Sikkim (*King's collectors!*).

Var. γ. CONNECTENS, *P. B.*; a tall or middle-sized herb; leaves plurilobate, shortly hairy or glabrescent above; sepals hirsute with yellowish hairs, but not silky; spur thick-conical, straight or incurved or uberiform, about as long as the sepals; ovaries ciliate at the ventral suture, otherwise subglabrous, but follicles ciliate and subhirsute.—Sikkim: Lebu valley (*Gammie!*).

Var. δ. GIGANTOBRACTEA, *P. B.*; a tall herb; leaves multilobate, upper surface rather densely and adpressedly pubescent; inflorescence many-flowered; bracts and bracteoles often very large, lobed or entire and oblong-linear; sepals sericeo-villose with yellow hairs; spur conical, shorter than the sepals, more rarely nearly equal to them in length; ovaries wholly hirsute.—Sikkim; on the Zey-lap-lā and Natu-lā; Chumbi: near Kung-bur (*King's coll. !*).

Evidently a variety of *D. viscosum* and having its place between var. *chrysotrichum* and var. *ciliatum* is Huth's *Delphinium trilobatum* (*Neue Arten der Gattung Delphinium tiré à part du Bulletin de l'Herbier Boissier, tome I, No.* 6, 1893). There is no specimen of Anderson's, exactly tallying with Dr. Huth's description, in the Calcutta Herbarium. The following is a translation of the description of the form referred to:—Stem shortly pubescent, simple, one-or few-flowered; petioles long, sheathing; leaves rounded, 3—5- partite, segments sub-cuneate crenate, incised, glabrous above, subpubescent below, bract on the pedicel multifid pubescent; bracteoles very large, close to the flower, trilobate, densely pubescent, 20 mm. long; spur straight, conical, 15 mm. long; sepals densely golden-pubescent, 30 cm. long; staminodes atro-violaceous, upper ones hairy at the apex, with a straight spur, the lower ones yellow-bearded, bifid, divisions lanceolate produced at the tip; immature follicles glabrous.—This description would apply to a specimen of var. *chrysotrichum* with the subglabrous leaves and the (sometimes) glabrous ovary of var. *ciliatum*. As already mentioned, var. *chrysotrichum* has sometimes trifid or tricrenate bracteoles; and with the large trilobate bracts occurring in some forms of *D. viscosum* it would not be astonishing if the bracteoles should here and there assume a similar form. The locality (probably the Jongri district) and elevation agree well with the supposition that *D. trilobatum* is probably only an aberrant form of var. *ciliatum*.

Plate 123. *Dhelphinium viscosum:* H. f. and Th. 1, var. *ciliata*, upper part of flowering stem; 2, var. *gigantibractea*; 3—7, var. *ciliata*; 3, nectariferous staminode; 4, petaloid staminode; 5, base of the same; 6, stamens; 7, pistil; 8, pistil of var. *gigantibractea*; 9, stigma; 10, follicle of var. *ciliata*; 11, seeds of the same.

DELPHINIUM SPECIOSUM *M. Bieb., subsp.* RANUNCULIFOLIUM.

Provided Turczaninow assigned to the term *lamellato-rugosus* the same significance that is attributed to it by Boissier and other botanists, he would have been the first to draw attention to the fact that two species, very similar in most respects, but radically differing in the structure of the testa of the seeds, have been confounded under the name *D. elatum*, Linn. On page 75 of his *Flora baicalensis* he enumerates among the diagnostic characters of *D. elatum*, "semina lamellato-rugosa lamellis imbricatis"; and in a note on page 76 he says: "*D. cuneatum* Stev. *semina habet compresso-triquetra angulis alatis et hoc charactere a varietatibus D. elati bene distinguitur.*" It is, however, possible that Turczaninow did refer to seeds which are puckered into true transverse wrinkles, as often seen in *D. grandiflorum*, *D. cheilanthum*, *D. stapeliosmum*, and especially in various forms of the real *D. elatum*. Boissier ascribed at first to *D. flexuosum*, M. Bieb., *D. dasycarpum*, Stev., and *D. speciosum*, M. Bieb. "*semina ad angulos alata*"; and it was Ruprecht who first, in his *Flora Caucasi*, showed that the last-named forms have lamellate, rugose seeds, and that it is precisely this character by which the group of *D. speciosum* is sharply distinguishable from that of *D. elatum*. To the former group belongs also the origial *D. ranunculifolium* of Wallich, in which the epidermis of the seed is thrown into transverse wrinkles at an early stage of development, these wrinkles gradually developing into imbricate scariose scales like those seen in *D. kashmirianum*, *D. incanum*, or *D. camptocarpum*. Some of the forms, however, included under the varietal name of *D. ranunculifolium* in the Flora of British India are true *Delphinium elatum*; as, for instance, the *D. Hoffmeisteri* of Klotsch, which should go to form a subspecies of *D. elatum* co-ordinate with the *D. incisum* of Wallich. The Indian varieties of *D. ranunculifolium* differ so much in the nature of their indumentum, in the size of the flowers, in the position and shape of the bracteoles, and in the size of the follicles and the relative length of spur and sepals, that the reduction of *D. flexuosum*, M. Bieb., *D. dasycarpum*, Stev., and perhaps of *D. formosum*, appears to be unavoidable. *D. Poltaratzkii*, Ruprecht, is known to the writer only from Ruprecht's description, but it seems closely related to some forms of *D. ranunculifolium*. Dr. Huth had the kindness to point out to the writer, who has verified the statement, that the sepals of *D. speciosum* are hairy on the inside, and that this species can thereby be distinguished from allied forms. And indeed all the specimens of *D. ranunculifolium* examined by me share that characteristic with *D. speciosum*. The fact, however, that in *D. incisum*, Wall., the sepals are either all of them glabrous, or all of them pubescent, or some of them glabrous and some pubescent, on the inner surface, appears to throw doubt on the diagnostic value of that character.

We subjoin a detailed description of *D. ranunculifolium*, (sp. of Wall.,) as far as this form is known at present.

A perennial herb. Rhizome descending, subcylindric, with filiform rootlets. Stem erect, straight or flexuous, terete or angular, striated or sulcate, fistulose, when flowering 30 to 100 cm. high (sometimes probably even higher), 4—8 mm. thick near the base, glabrescent below, upwards either subglabrous, or hirsute with shining deflexed or spreading longish hairs; floral axis usually densely pubescent with white or yellowish crisp hairs usually intermixed with glandular hairs. Branches patulous, the lower ones sometimes 40 cm. long. Leaves from very long-petioled below to short-petioled upwards, with slender, beneath prominent, nerves; petioles slender, hardly dilated at the base (rarely distinctly sheathing), hirsute to subglabrous, 8—15—40 cm. long, lower ones usually about twice as long as the lamina; blade of a firm texture, broad-reniform to broad-ovate in outline, of lower and middle leaves 8—15 cm. long, tripartite to $\frac{3}{4}$ or $\frac{4}{5}$, cordate with the sinus triangular or semiorbicular, beneath pale, nearly glabrous at both surfaces or subtomentose beneath or more or less pubescent above, or beset with stiff hairs, especially along the nerves beneath; segments spreading, lateral ones trapezoid, unequally bifid, the middle and intermediate divisions ovate-oblong or deltoid or rhomboid or oblong-lanceolate in outline, all of them bipinnately cleft and incised-serrate or crenate-serrate, serratures from broad-ovate to lanceolate, callose-apiculate; upper leaves sometimes lanceolate, incised-serrate. Inflorescence racemoso-paniculate; racemes 8—15, but also 60 cm. long. Bracts at the base or higher up on the pedicel, broad-lanceolate, oblanceolate or linear, acute or sub-obtuse, 6—20 mm. long, hairy, more or less ciliate. Bracteoles usually close to the flower, broadly lanceolate to linear, 5—15 mm. long, ciliate. Sepals spreading or patulous, 12—20 mm. long, 3—5-nerved, blue or (more rarely) purple, hairy on both sides; lamina of posterior sepal ovate, obtuse; spur ascending or horizontal, about as long as the lamina or distinctly shorter, conical, straight or little curved; lateral sepals ovate or elliptic, rounded, anterior ones elliptic-oblong, obtuse or rounded. Staminodes bluish-black, shorter than the sepals; lamina of nectariferous staminodes bidentate or subcrenate at the tip, spur open on the inner side to about one-half, and here often minutely pubescent, subulate below; lamina of petaloid staminodes asymmetrically ovate, deeply and unequally bifid, 5—8 mm. long, upper surface villously bearded, margins ciliate, lower surface subglabrous; claw about as long as the lamina. Stamens about 30—40, about half as long as the sepals, glabrous; filaments lanceolate below, subfiliform above, 5—7 mm. long; anthers ellipsoidal, 1 mm. long. Pistils 3, rarely 4, 5—8 mm. long; ovaries ovate-oblong, 3—6 mm. long, pubescent, or glabrous except the sutures; style filiform; stigma shortly bilobed. Follicles 3 (or 4), ovoid or usually cylindric, chartaceous, reticulate, 8—25 mm. long, truncate at the apex, glabrous or hairy. Seeds numerous, obpyramidate, dorsally broader, covered with scariose, scale-like, epidermal wrinkles, 1·5—2·5 mm. long.

Flowers in August and September.

From Baltistan to Nipal, extending probably westwards into the Hindu Kush and northwards into Tibet.

Var. a. BRACHYCENTRA, *P. B.*; stem more or less flexuose, upwards with short spreading hairs; (upper) leaves reniform, rather sparsely pubescent on both surfaces; pedicels much longer than the flowers, suberect, stout; bracteoles close to the flowers, linear or oblanceolate; sepals 17—25 mm. long; spur often subrecurved, subulate, $\frac{1}{2}$ to $\frac{3}{5}$ the length of the sepals; follicles cylindric.—Western Tibet (*Herb. Falc. !*); Gilgit (*Giles*: *D. vestitum !*).

Var. β, ERIANTHA, *P. B.*; stem puberulous, pubescent in the upper part of the floral axis; leaves reniform, very coarsely and triangularly serrate, little hairy on both sides; pedicels ascending, stout, much longer than the pale blue flowers; bracteoles oblanceolate-linear, usually alternate, rather remote from the flower; sepals patulous, with long soft white hairs; spur distinctly shorter than the sepals, stout, conical, obtuse; follicles 3—4, ovoid. about 1 cm. long.—Flowers in August.—Kashmir: Kamri Pass, 12—13,000′ (*Duthie !*).

Var. γ. THYRSANTHA, *P. B.*; stem glabrescent below, floral axis densely pubescent; leaves ciliate, otherwise rather sparsely and coarsely hairy or nearly glabrous, reniform or isodiametric; pedicels patulous, many times longer than the flowers, rather slender; bracteoles ovate or broad-lanceolate, close to the flowers; sepals about 2 cm. long, pubescent, blue, patent; spur, stout conical, often nearly as long as the sepals, blunt, as a rule incurved; follicles cylindric, about 2–5 cm. long.—Flowers in July and August.—Kashmir: Liddar valley, 9—11,000′ (*Duthie !*).

Var. δ. LASIANTHA, *P. B.*; stem glabrescent below, floral axis tomentose; upper surface of leaves densely adpressed-hairy, lower hirsute; leaf-segments rhombic or broadly oblong, cleft and unequally incised-serrate, serratures linear; bracteoles somewhat remote from the flowers, broad-linear; buds silky-villose with white hairs; spur about as long as the sepals, subincurved; ovaries minutely and densely pubescent, hairy at the tip.—Kumaon; Dhauli valley, 9–10,000′ (*Duthie !*).

Var. ε. PULVERULENTA, *P. B.*; stem glabrescent below, floral axis densely minutely pubescent; leaves subisodiametric, puberulous above, like the pedicels densely minutely pubescent (indumentum resembling a fine powder); pedicels suberect, not longer than twice the length of the spur; bracteoles close to the flowers, small, linear; sepals 12–15 mm.; spur subulate, incurved at the apex, rather longer than the sepals; carpels pubescent.—Eastern Kashmir, on slates and sandstones in the Marbal pass (*Stoliczka !*); Garhwal. (*Falconer !*).

Var. θ. OINOPHYLLA, *P. B.*; stem glabrescent below; floral axis velvety with short, spreading, partly glandular hairs; petioles subhirsute; leaves broadly ovate, pubescent above, subtomentose below; leaf-segments oblong-lanceolate, pinnately cleft, coarsely crenate-serrate; bracteoles close to the flowers, narrow-lanceolate, acute; sepals purple, 12—15 mm.; spur subulate, rather longer, subincurved; follicles cylindric, sparsely hairy.—Kashmir: Singpur, 8,000′ (*C. B. Clarke !*).

Var. η. MARRIENSIS, *P. B.*; stem glabrescent below, otherwise (like the petioles) hirsute, with white, shining, deflexed, rather soft, partly glandular hairs; leaves adpressed-hairy above, hirsute beneath, especially along the nerves; leaf-segments broad-lanceolate, pinnately cleft, coarsely and acutely serrate; bracteoles linear; sepals hairy; spur incurved; ovaries subvillose along the ventral, subhirsute along the dorsal suture, otherwise subglabrous.—Panjab: Himalaya, near Marri (*Drummond !*).

Var. ς. KATATRICHA, *P. B.*; stem subglabrous downwards, upwards hispid, with white, shining, subrigid, deflexed hairs, indumentum denser but shorter towards the apex and intermixed with bulbous hairs; leaves hairy above, sub-hirsute beneath, especially along the nerves; middle leaf-segment deltoid-oblong, sparsely cleft, coarsely crenate-serrate; bracteoles close to the flowers, lanceolate, acute; sepals pubescent, 1·5 cm., long, spur subcylindric, blunt, slightly incurved, about as long as the sepals; ovaries pubescent.—Kumaon, in the Rālem valley, 10—11,000′ (*Duthie !*).

From *D. speciosum* and allied forms *D. ranunculifolium* is distinguished by the ultimate leaf-segments being nearly always broad, ovate, with triangular serratures, not lanceolate or linear, except in var. *lasianthum*, which has incised partitions, the serratures being linear. The existence of this variety appears to render the reduction of *D. ranunculifolium* to *D. speciosum* imperative.

PLATE 127. *Delphinium speciosum*, M. Bieb. subsp. *ranunculifolium*. fig. 1—5, flowers; 1, 2 of *D. speciosum* from the Caucasus; 3, of *D. speciosum* from Tabriz; 4. subsp. *ranunculifolium*, var. *erianthum*; 5, of var. *thyrsantha* with reniform leaves; 6, hairy inner surface of anterior sepal of var. *brachycentra* from Gilgit; 7, petaloid staminode; 8, follicle of var. *eriantha*; 9, of var. *thyrsantha*; 10, seeds (*a*) from var. *thyrsantha*, (*b*) from var. *eriantha*, (*c*) from var. *oinophylla*.

DELPHINIUM PACHYCENTRUM, *Hemsl.*

Stem erect, simple or somewhat branched upwards, stout, subangular; leaves rather crowded, isodiametric, 5-partite; inner segments oblong-lanceolate, more or less pinnately cleft, incised, and serrate; petioles not sheathing; inflorescence a dense or somewhat lax raceme, rarely subcorymbose; pedicels erect or patulous; sepals bluish, softly hairy;

sepaline spur stout-cylindric or thick-conical, slightly incurved, very blunt, as long as, or longer than, the lamina; staminodes shorter than the sepals; lamina of anterior staminodes light blue, orbicular, subentire; carpels 3—5.

Distribution: Eastern Tibet, from the northern frontier of Sikkim to Setchwan.

The variety from Southern Tibet was figured by the writer about three years ago for the present volume of the Annals under the name of *D. Kingianum*; on receiving Pratt's plants he at once recognised the close relationship between the form in question and a new *Delphinium* gathered in the Tachienlu region. Meanwhile Mr. Hemsley described the latter under the name of *D. pachycentrum*, for which reason the writer has, by the kind permission of Dr. King, substituted a new plate for the original one and rechristened the Southern Tibetan form subsp. *tsangense*. We have thus—

Subspecies I.—HEMSLEYI; stem very stout (7—9 mm. in the middle), like the pedicels densely pubescent with minute retrorse crisp hairs; inflorescence strictly racemose; flowers crowded; pedicels erect; sepals on both sides minutely and softly pubescent; sepaline spur about $\frac{3}{4}$ the length of the lamina, stout-cylindric, blunt; lateral sepals obovate-oblong; carpels usually 3 or 4.—Tachienlu region (*Pratt !*).

Subspecies II.—TSANGENSIS, *P. Brühl*; stem rather slender (3—5 mm. in the middle), glabrescent below, upwards hairy, more or less glandular; inflorescence racemose, subpaniculate or subcorymbose, somewhat lax; pedicels patulous; sepals glabrous inside, the anterior ones and posterior one hairy all over on the outside, the lateral ones puberulous along the middle; sepaline spur about as long as, or very slightly shorter than, the lamina, stout cylindric; carpels usually 5, more rarely 3.—Between the northern frontier of Sikkim and Lhassa (*King's collector !*).

Var. α. DASYCARPA *P. B.*; ovaries villose-pubescent.

Var. β. LEIOCARPA, *P. B.*; ovaries quite glabrous or slightly ciliate along the ventral suture.

Description of subspecies tsangensis.—Stem erect, subflexuose, subangular, densely foliose upwards, glabrescent downwards. Upper infrafloral leaves shortly-petioled; blade of firm texture, subpentagonal in outline, cordate, nearly isodiametric, trisect, pubescent, especially along the margin and the nerves; middle segment oblong-lanceolate, towards the base cuneate, 3—4 cm. long, 12—15 mm. broad, pinnately trifid, acute; middle lacinia $\frac{1}{2}$ the length of the segment, incised with 2 or 3 serratures on either side; lateral laciniæ twice or three times shorter, obliquely ovate, pauciserrate; lateral leaf-segments trapezoidal, very broad-cuneate, unequally bipartite beyond the middle, 25—32 mm. broad; intermediate partitions similar to the middle segment; outer ones broader, unequally bifid, sparsely incised-serrate; all serratures apiculate; petioles not dilated at the base, semiterete, canaliculate, 15—5 mm. long, hairy, sparsely glandulose. Inflorescence many-flowered, 4—12 cm. long; flowers on the lateral branches rather crowded. Floral axis beset with glandular and eglandular hairs. Floral leaves subconform to lower ones, but gradually more shortly petiolate, the uppermost ones rather more simple. Pedicels patulous, terete, lower ones 2·5—5 cm. long, uppermost 1—2·5 cm. long, indumentum like that of floral axis, towards the apex bibracteolate and villous. Bracteoles opposite, linear, acute, 6—11 mm. long, hairy. Sepals membranous, pale blue. Sepaline spur obtuse, sometimes 2 mm. shorter than the lamina. Nectaries glabrous; lamina oblong-subspatulate, 2—4 mm. shorter than the lamina of the posterior sepal, obtuse, entire; spur about as long, open laterally to about the middle, below the slit subulate, acute. Anterior staminodes hairy on the back, lamina 6—7 mm. long, about as long as the claw. Stamens 25—30, subequal, 7—9 mm. long; filaments membranous, dilated below, with the wings attenuated upwards and ciliate; anthers elliptic, 1 mm. long. Carpels 5, rarely 3, 5—7 mm. long; ovary ovoid-oblong; style about 2 mm. long, at first straight but finally recurved. Ovules numerous.

PLATE 128. A. Subspecies *Hemsleyi*, Tachienlu region. B. *Delphinium pachycentrum*, Hemsl. subspecies *tsangensis* Tibet. 1, anterior, 2, lateral, 3, posterior sepals, (*b*) inner, (*b**) outer surface; 4, petaloid staminodes; 5, nectariferou staminodes; 6, gynœcium, (*a*) of subspecies *Hemsleyi*, (*β*) of subspecies *tsangensis*, var. *dasycarpais*, (b,* b**) of var. *leiocarpa*; 7, upper extremity of style; 8, stamens.

ACONITUM FEROX, *Wall.*

(A. ferox, *Wall. in Seringe Mus. Helv. I*, 160; *DC. Prodr. I*, 160; A. virosum, *Don*; "A. ferox et A. atrox, *Wall. in litt.*": *Don, Prodr.*; A. palmatum, *Don, Prodr.*; A. lethale, *Griff. Notul.*)

Stem entirely simple or branched upwards, erect; leaves reniform, orbicular, more rarely ovate, usually cordate, 5—7-lobed or partite, sometimes trisect; inflorescence racemose or racemose-paniculate; helmet more or less vaulted, more rarely navicular; nectaries included, claw longer than spur, spur conical with terminal globose recurved tip, more rarely saccate, club-shaped, or subglobose; labellum bilobed or marginate, very short or oblong; follicles subcylindric; seeds obpyramidal, epidermis folded into transverse sinuous scariose wrinkles of various width.

Flowers from July to September.

Distribution: Temperate Himalaya: Kashmir; Garhwal to Sikkim; Chumbi and Phari.

Subspecies I. MOSCHATUM, *P Brühl*; stems simple; leaves reniform; flowers musky; sepals purplish-brown; helmet navicular; nectaries slightly recurved at the apex; spur broadly and shortly saccate, very obtuse; labellum about as long as the spur, obovoate, nearly entire; follicles about 2 cm. long; seeds broadly obpyramidate, with broad scariose wrinkles.—Kashmir: on rocks, Sonsa nallah, Liddar valley, 13—14,000′ (*Duthie !*); Musjid valley, 12—13,000′ (*Duthie !*).

Flowers in July.

Description of subspecies I.—Rhizome fusiform or irregularly cylindric. Stem erect, simple, straight, terete, 50—90 cm. high, about 4—9 mm. thick near the base, glabrescent below, more and more densely hairy upwards, subtomentose with yellowish hairs along the floral axis. Leaves all or most of them basal, very long-petioled, palminerved with the nerves little prominent on the lower and much paler surface, reniform in outline, breadth $\frac{3}{2}$—$\frac{9}{5}$ of length, palmately tripartite to $\frac{1}{2}$ or $\frac{3}{4}$, ciliate, puberulous above, subglabrous below except nerves; lateral segments rounded-subtrapezoidal, unequally 3—4-lobed, middle segment three-lobed upwards; lobes broadly cuneate, coarsely dentate-crenate, crenatures subobtuse, apiculate; petioles sheathing at the base, rounded upwards, striate, usually 20—30 cm. long, somewhat hairy; infrafloral cauline leaves, where present, similar to the basal ones. Inflorescence strictly racemose, usually lax, many-flowered; floral leaves short-petioled below, sessile upwards; the lowest trisect or deeply tripartite, segments entire or cleft, upper ones bract-like, lanceolate, diminishing in size upwards; pedicels erect, the lowest much longer than the upper ones, about as long as the flowers, densely villose-pubescent; bracteoles inserted above the middle, linear-lanceolate, 8—12 mm. long. Flowers musky. Sepals rather spreading, purplish-brown, outside rather densely covered with coarse yellowish hairs; helmet navicular, attenuated downwards, scarcely produced at the apex, 13—16 mm. high, lower part erect; lateral sepals broadly obovate, about 12 mm. long, 8—9 mm. broad; anterior ones unsymmetrically elliptic, obtuse, 9—10 mm. long, 5—6 mm. broad. Nectaries erect, somewhat recurved upwards, glabrous; claw linear, dilated upwards, 8—9 mm. long; spur broadly and shortly conical, very obtuse, 4—5 mm. long; labellum spreading, about as long as the spur, obovate, scarcely emarginate. Stamens not very numerous, laterally enclosed; filaments 5—6 mm. long, membranously dilated from the middle downwards, subfiliform upwards, the dilated part attenuate; anthers subglobose, 0·8 mm. long, dark-coloured. Pistils 3, erect, 5—6 mm. long; ovaries oblong, densely hairy; style shorter than the ovary. Follicles subparallel, ovoid at the base, subcylindric upwards, rounded at the apex and attenuated into the persistent style, reticulately veined, more or less hairy. Seeds obpyramidal, three-sided, about 2 mm. long; testa black; wrinkles conspicuously scariose.

This is a species of the second rank; it is, however, closely allied to the group of forms included in subspecies II, but somewhat more distantly related to *A. palmatum.*

Subspecies II. FEROX PROPRIUM (*A. ferox,* Wall); stems simple below, branched or simple upwards; leaves mostly suborbicular or ovate, more rarely reniform; flowers not musky; sepals variously coloured; helmet vaulted, rarely navicular; nectaries slightly or distinctly recurved upwards, often hairy: spur usually conical with more or less recurved capitate apex, rarely cylindrical and obscurely capitate or subglobose; labellum oblong or spatulute, $\frac{1}{2}$—$\frac{1}{4}$ the length of the spur, emarginate or bilobed; follicles 13—26 mm. long; seeds broadly obpyramidal, with broad scariose transverse wrinkles.

The following varieties can at present be distinguished:—

Var. a. SPICATA, *P. B.*; floral axis and pedicels subtomentose with spreading hairs; leaves isodiametric or broadly ovate, sometimes reniform, 5-partite, divisions pinnately cleft and incised; flowers 20—35, in an elongated, mostly simple, narrow raceme (inflorescence rarely subcorymbose); pedicels strictly erect; spur of nectaries conical, capitate, recurved; follicles short-cylindric, densely hirsute when young.—Garhwal (*Falc.!*); Nipal (*Scully!*); Sikkim, on Sandakphu, Phullut, Phullalong, Tonglu (*Kurz, King, T. Thomson, C. B. Clarke!*); S. E. Tibet (*King's Collectors!*).

Var. β. LAXIFLORA, *P. B.*; floral axis and pedicels subtomentose; leaves broadly ovate to broad-reniform, deeply tripartite, lateral segments unequally bipartite, divisions cleft and incised, laciniæ lanceolate; flowers 2 or moderately numerous, disposed in a very lax raceme or panicle; pedicels long, stout and spreading; spur of nectaries conical, hooked at the tip; follicles as in *a.*—Sikkim: Sandakphu (*Gamble!*); S. E. Tibet (*King's Collectors!*).

Var. γ. HETEROPHYLLOIDES, *P. B.*; floral axis densely pubescent; cauline leaves ovate-cordate, 8—10 cm. long, 6—7 cm. broad, sub-3-partite, middle division 5—6 cm. long, ovate-lanceolate, nearly twice as long as the lateral ones, more or less pinnatifid and serrate; inflorescence many-flowered, racemose-paniculate, terminal raceme elongate; floral leaves similar to the cauline ones; helmet erect, high; nectaries with conical capitate hooked spur and densely hairy claw; follicles somewhat spreading, when young hirsute.—Sikkim: on Singalela and Phullalong (*Clarke!*).

Var. δ. ATROX, *Wall.*; floral axis densely pubescent; leaves nearly isodiametric, 5-partite, divisions pinnatifid and serrate-incised, rarely incised-crenate; flowers usually dark-blue, in a rather short, somewhat dense, 10—15-flowered raceme; pedicels erect-patulous; helmet much vaulted, not gaping; spur of nectary conical, capitate, recurved; follicles cylindric, 18—24 mm. long, pubescent.

Subvar. aa. lacinulæ acute: (*Wall. cat.* 4721 *C!*); Garhwal, above Bhowani 13—14,000′ (*Duthie!*) Kumaon (*Wall. cat.* 4721*C!*), in the Rālem valley (stem sometimes reddish, *Duthie!*); Sikkim (*T.T!*).

Subvar. ββ. lacinulæ subobtuse: Nipal, on Nampa Gadh 12—13,000′ (*Dhutie!*), Gosain Thān (*Wall. cat.* 4721 *B!*).

Var. ε. LEUCANTHA, *P. B*; stem 30—80 cm. high, rather thin, 3—4 mm. near base, glabrescent below, densely pubescent with soft crisped hairs upward; leaves thin, rather small, broad-ovate to subreniform, deeply 3-partite, lateral divisions less deeply bipartite, partitions often conspicuously pinnatifid and incised, lacinulæ subobtuse apiculate; inflorescence a 4—10-flowered, usually lax raceme; pedicels subtomentose, erect, slender; sepals white, or white and blue or greenish-blue; helmet vaulted, rarely subnavicular.—Sikkim: Jongri, Ling-tū, Jongri-Pokri, Ten-chang (*King's collectors!*).

Var. ζ. CRASSICAULIS, *P. B.*; stem 1—1·5 m. high, densely pubescent with fine crisp hair, more rarely velvety with rather coarse spreading hairs, 1—1·5 cm. thick near base; leaves firm, nearly isodiametric, tripartite, divisions pinnatifid, laciniæ broadly-oblong, serrate or crenate-serrate, nerves prominent below; flowers numerous (20—30 in terminal raceme), forming a simple or compound, rather dense raceme; pedicels slender, spreading, inarcuate, finally recurved at tip; sepals dark-blue; helmet usually much vaulted; spur of nectaries broadly conical, hooked, capitate, glabrous; ovaries densely hirsute.—Sikkim: Thunku, 12,000′ (*King's collectors!*); Lachung valley, 12,000′ (*Gammie!*).

Var. η. LANCEIFIDA, *P. B.*; stem glabrescent below, densely hirsute upwards; leaves reniform, sub-5-partite, divisions rather sparsely pinnatifid, laciniæ broad-lanceolate, entire or scarcely incised; inflorescence short, racemose, rather dense; sepals pale-blue; helmet semicircularly vaulted; ovaries densely hirsute.—Kumaon: in the Rālem valley (*Duthie!*).

Var. θ. LACINIATA, *P. B.*; stem upwards puberulous or pubescent; leaves nearly isodiametric trisect, lateral segments deeply bipartite, all divisions duplicate-pinnatifid beyond the middle; laciniæ and lacinulæ lanceolate-linear or linear acute or acuminate; inflorescence racemose, rather dense; pedicels erect-patulous or ascending, rather slender, densely pubescent; sepals dark-red (perhaps also blue); helmet semicircularly vaulted, beak usually conspicuous; spur of nectaries conical capitate and recurved at the tip, claw densely hairy; ovaries hirsute; follicles cylindric, about 24 mm. long, minutely pubescent.—Garhwal: Massūri range (flowerless specimens); Kumaon: Rālem valley (*Duthie!*); Sikkim: on the Sandakphū, 12,000′; in the To-ko-lā and Cho-lā (*King's collector's!*). To this variety appears to belong "Caltha? Nirbisia" of Buchanan-Hamilton, *Wall. Cat.* 5721 *D.*—In habit, in form of leaves and in flowers, *A. ferox laciniata* closely approximates *A. Kusnetzoffii* Rchb., var. *A typica*, Regel (*Reichenbach, Ill. Sp. Ac. Gen., tab. XXI; Regel, Ostsibirien, page* 94), which has a wide distribution in Northern Asia; it differs from the latter by the pubescence of the floral axis pedicels and carpels, and by its conical, not dome-shaped, nectarial spur, which is hooked at its very tip.

Var. ι. FLAVIDIFLORA, *P. B.*; flowering stem 20—60 cm. high, 2—5 mm. thick, upwardt puberulous or villose-pubescent; leaves reniform, 2·5—6 cm. broad, 5-partite, middle and intermediate divisions pinnately cleft and serrate, laciniæ oblong as ovate, serratures subacute; inflorescence 2—many-flowered, racemose as racemose-paniculate; pedicels erect or patulous, thick or slender; sepals pale yellow or greenish-yellow; helmet semicircular; spur of nectaries conical, capitate, much hooked, claw as well as the filaments hairy; ovaries pubescent; follicles 14—24 mm. long, more or less hairy.—Chumbi: at Me-rik-lā and Tu-key-kung (*King's collectors!*).

Var. κ. CYMBIFORMIS, *P. B.*; stem quite simple, glabrescent downwards, densely pubescens on the floral axis; leaves small (2—6 cm. broad), subisodiametric, deeply tripartite, lateral segments unequally but less deeply bipartite, divisions pinnately cleft and incised, lacinulæ rather acute; inflorescence 5—9- flowered, racemose, lax; sepals blue; helmet navicular; spur of nectaries conical, hooked, tip globose.—Sikkim: near Tha-pa, 13,000′ (*King's collectosr!*).

Var. λ. NAVICULARIS, *P. B.*; stem glabrescent below; floral axis and pedicels, pubescent, 2—3 mm. thick near base; leaves small (about 3 cm. broad), subreniform, deeply 3-partite, lateral segments deeply 2-lobed, all divisions 2—3-lobed, laciniæ sparsely incised, lacinulæ blunt; inflorescence lax, rather few-flowered; pedicels erect, rather slender; sepals reddish blue; helmet navicular; spur of nectaries globose, shorter than the obovate emarginate labellum.—Chumbi: near Kung-met.

Subspecies III. PALMATUM, (*Don pro sp.*); stem simple below; upwards usually branched; leaves reniform, rarely subisodiametric; flowers not musky; sepals greenish-blue, or partly white, partly blue; nectaries slightly recurved; spur club-shaped more rarely subglobose, labellum 3—5 times shorter, emarginate; follicles 25—35 mm. long, glabrous or more rarely pubescent; seeds narrow-obpyramidate, testa black, epidermal wrinkles narrow.—Garhwal (*Herb. Falc. No.* 68*!*); Nipal (*Wall. Cat.* 4723 *A!*); Sikkim: (*Hook fil.!*); on Tonglū (*Kurz, Anderson!*), Phullalong (*Clarke!*), Phullut (*T. Thomson!*), Na-tong (*Pantling!*); Phari: near Gūp (*King's Collectors!*).

The only reliable character by which *A. palmatum* can be distinguished from *A. ferox* is the form of the seed and the width of the transverse wrinkles; but sometimes the wrinkles of the seeds of *A. palmatum* are rather wider than they are commonly; so that it appears preferable to consider *A. palmatum* a subspecies of *A. ferox*. The geographical distribution of the two is about the same.

PLATE 111. *Aconitum ferox*, Wall. (A) flowering plant of subsp. *moschatum*, from Kashmir. 1, flower of subsp. *moschatum*, cut longitudinally. 2—10, flowers, natural size. 2—8 of *A. ferox proprium*; 2, var. *navicularis*, Chumbi; 3, var. *cymbiformis*, Tha-pa, Sikkim; 4, var. *flavidiflora*, Jongri; 5, var. *flavidiflora*, Me-rik-lā; 6, var. *spicata*, Tsang. Tibet; 7. var. *laciniata*, Cho-lā, Sikkim; 8, var. *laciniata*, To-ko-lā, sepals dark red; 9, subspecies *palmatum*, Gūp, Phari. 10, subspecies *palmatum*, Phullūt; 11—19, nectaries: 11—13 of *A. palmatum*: 11, Nipāl; 12, Gūp; 13, Tonglū. 14—19 of *A. ferox proprium*: 14, var. *navicularis*, Kung-met; 15, var. *atrox*, Garhwal; 16, var. *laxiflora*, Sandakphū; 17, var. *laciniata*, Cho-lā; 18, var. *heterophylloides*, Singalelā; 19, var. *flavidiflora*. 20—25, ripe follicles: 20, *A. moschatum*; 21, *A. ferox spicata*; 22, *A. ferox flavidiflora*; 23, *A. ferox atrox*; 24, 25, *A. palmatum* 26—31, seeds: 26, *A moschatum*; 27. *A. ferox flavidiflora*; 28, *A. ferox laxiflora*; 29, *A. ferox spicata*; 30, *A. ferox laciniata*; 31, *A. palmatum*, Sikkim.

ACONITUM LURIDUM, *H. f. et T.*

(*Hook. fil. Flora Indica* 55; *Flora of Brit. Ind., vol. I, p.* 28.)

Rhizome irregularly cylindrical; stems simple, erect; leaves subreniform, palmately tripartite or trisect with the segments deeply cleft and incised-serrate; inflorescence racemose, many-flowered, axis densely hairy; posterior sepal with hemispherical dorsal prominence and long produced beak; base of stamens enclosed; nectaries mallet-shaped with oblong bifid labellum and short broad claw; follicles 3, ovoid; seeds three-sided, with convex back and the dorsal edges winged, otherwise smooth.

Distribution: Alpine regions of Sikkim and Chumbi. On Phulut, at the To-ku-lā, Zē-lap-lā, Tang-ka-lā (*King's collectors !*), Tankra et Cho-lā (*Hooker fil. !*); in Chumbi, near Tuck-e kung (*King's collectors !*). Flowers in August and September.

Description.—Rhizome often branched, covered near the apex with the bases of fallen leaves. Stems slender, subcylindric, when flowering 36—70 (even 90) cm. long; near the base 3—5 mm. thick, beset with spreading hairs. Infra-floral leaves crowded near the base; blade in the outline suborbicular or reniform, cordate at the base; 25—8 cm. long, 5—10 cm. broad, on the upper surface sub-adpressedly hairy, lower surface less hairy, nerves more densely pilose; middle segment obovate oblong, broad-cuneate, upwards deeply pinnately trifid; lateral segments trapezoidal, unequally bipartite, inner division similar to the middle segment, outer shorter unsymmetrically bifid; all segments coarsely crenate-serrate, serratures apiculate; petioles moderately dilated at the base, canaliculate, hairy, basal ones 20—30 cm. long. Inflorescence usually simple, sometimes with a few spreading, lateral branches, 8—40 cm. long; floral leaves gradually diminishing from the lowermost tripartite to the uppermost linear-lanceolate one. Pedicels usually shorter than bracts and flowers, densely hairy, 0·5—1 mm. thick; bracteoles above the middle of the pedicel, opposite, narrow-lanceolate, 2—3 mm. long. Sepals brownish-purple, or pale red, inside sometimes yellowish; posterior one subcompressed, densely hairy, 6—8 mm. high, 10—12 mm. wide with the dorsal process dome-shaped and either hemispherical or hemispherical with short cylindric base, process 4—6 mm. high, 5—6 mm. wide; beak horizontal or a little descendent, obtuse at the apex, sinuate at the margin; lateral sepals obovate cuneate somewhat asymmetric, 9—11 mm. long, 7—8 mm. broad, outside hairy, inside hairy near the end of middle nerve, otherwise hairy or glabrous; anterior sepals 7—8 mm. long, obtuse, one obovate, the other subspatulate.

Nectariferous staminodes enclosed, erect, hammer-shaped, glabrous; claw 3—5 mm. long, conduplicate, straight, broader towards the base; spur 1·2—1·8 mm. long, capitate, forming an acute angle with the claw; labellum 2·5—3·5 mm. long, usually at right angles to the claw. Stamens about 20, outer ones 7—10 mm. long; filaments filorm above the middle, membranous-dilated below; anthers subglobose, about 1 mm. long. Pistils 3, erect, 4—5·5 mm. long; ovaries oblong-ovoid, densely hairy; style subcylindric, $\frac{1}{2}$—$\frac{1}{1}$ the length of the ovary; stigma shortly bilobed. Follicles subdivergent, chartaceous, obovoid-subcylindric, crowned with a short style, 8—10 mm. long, 3—4 mm. broad near apex, hairy or glabrescent. Seeds about 5—6.

PLATE 124. *Aconitum luridum*, H. f. and Th.—1, flowering plant; 2, anterior; 3 lateral; 4 posterior sepal; 5, posterior sepal cut open and flattened out; 6, nectary; 7, stamens; 8, pistils; 9, upper part of style; 10, follicle; 11, seed.

ACONITUM GYMNANDRUM, *Maxim.*

Rhizome fusiform, leaves bipinnatisect with the segments incised-serrate; inflorescence racemose, more rarely subcorymbose, many-flowered; sepals long-clawed, leaving the stamens uncovered, posterior one subnavicular; nectaries with broad claw, a shortly-cylindrical obtuse spur and a very large, protruding, semi-circular, dentate labellum; follicles 5—8; seeds narrow obpyramidal three-sided with narrowly and sinuously plaited testa.

Flowers in August.

Phari: Kang-mā, 60 miles north of the town of Phari; Ting (*King's coll. !*); Tachienlu region (*Pratt No.* 496, 507 !); Kansu.

Description.—Rhizome descending, fusiform or subcylindrical, 5—10 cm. long, sometimes branched. Stem usually short or of medium size, straight or ascending, simple or branched from the very base, 5—30 (—90) cm. high, near the base 3—4 mm. thick, leafy, glabrous or more or less covered with white longish hairs, upwards often villous. Leaves more or less hairy, the infra-floral ones long-petioled, crowded or rather remote; lamina bipinnatisect, about 3 cm. long, yellowish-green on the lower surface; primary segments petiolulate, lowest pair sub-bipinnatisect, upper ones pinnatipartite with the divisions spreading, incised and serrate, serratures apiculate. Inflorescence racemose or racemose-paniculate or in smaller specimens subcorymbose; racemes usually elongate, lax or rather dense; floral leaves mostly short-petioled, upper ones subsessile, lower subsimilar to the infra-floral leaves, upper ones narrower and simpler; pedicels erect or slightly spreading, during flowering time shorter than the flowers, afterwards elongating, the lowest finally 3·5—5 cm. long, 1—1·5 mm. thick; bracteoles near the base of the flower or somewhat remote, alternate or opposite, sessile or very shortly petioled, variously divided or undivided and linear. Sepals bluish-purple, long-clawed, sub-villous outside, deciduous; posterior one unguiculate-navicular, very shortly and obtusely rostrate, claw broad erect 9—11 mm. long, lamina more or less horizontal, about as long as the claw; lateral sepals about 15 mm. long with unsymmetrical suborbicular lamina and the claw 6—7 mm. long, about 2 mm. broad; anterior sepals spatulate, about 13 mm. long, lamina 4—5 mm. broad, obtuse at the apex, claw about 3 mm. broad near base. Nectariferous staminodes 2; claw nearly straight, flattened, broad-linear, hyaline at the edges, 12—13 mm. long, about 2·5 mm. broad; spur about 4 mm. long; labellum 5 mm. long, 9 mm. broad, dentate or crenate, reaching beyond the helmet. Stamens 40—50, unequal, 5—8, mm. long, persistent; filaments dilated below, coloured, ciliate; anthers subglobose, dark-blue. Pistils 5—8, mostly 8, erect, 4—5 mm. long; ovary ovoid-oblong, more or less villous; style shorter; stigma shortly bilobed. Follicles with fine transverse veins membranous, cylindric, rotundate-truncate at the apex, 8—9 mm. long, somewhat hairy, style persistent, straight, erect, 2—2·5 mm. long. Seeds about 2 mm. long, ventral side narrowly keeled, sides slightly convex, testa black.

PLATE 125. *Aconitum gymnandrum*, Maxim. 1, small sized specimen; 2, helmet; 3, lateral; 4, anterior sepal; 5, nectary; 6, stamen; 7, pedicel with bracts and carpels; 8, seed; 9, ripe follicle.

PAEONIA MOUTAN, *Ait.*

(*Ait. Fl. Kew. ed.* 2, *vol. III, p.* 315, 1811; *DC., Prodr. vol. I, p.* 65; *Sims, Bot. Mag. t.* 1158; *Anderson, Mon. in Tr. Linn. Soc. XII, p.* 252; *Huth, Mon. in Engler Bot. Jabrb. XIII, p.* 272.)

Stem branched, base of annual shoots covered with scales, leaves sub-bipinnately or biternately divided, lateral leaflets lobed or entire, terminal ones 3—5-lobed or cleft with the lobes ovate, petals 8 or more, rarely 5—7, carpels 5, subtomentose with coarse short hairs, disc urceolate finally usually irregularly split, follicles divergent.

Subspecies ATAVA, *Paul Brühl*, petals 5—7 (—8), 4—7 cm. long, suborbiculate.

Description.—Annual shoots alternate, covered at the base with numerous imbricate many-veined ovate apiculate scales 6—20 mm. long, subcylindrical, glabrous. Leaves 4—6 on each branch, alternate, long-petioled, large, the uppermost ones often smaller and less divided, even trifoliate; blade 7—15 cm. long, primary divisions short-petioled, more or less distinctly ternately arranged, themselves usually pinnate and 5-foliolate, sometimes trifoliolate; leaflets herbaceous, the lowest pair very short-petioled, broadly ovate, subpinnately unsymmetrically and coarsely cleft and subserrate, rarely entire, without the petiolule 2—4·5 cm. long, 1·2—3 cm. broad; intermediate leaflets ovate- or elliptical-oblong, entire or scarcely incised-serrate, 2—4 cm. long, 1—2 cm. broad, always narrower than the remaining ones; terminal leaflets (3—) 4—5·5 cm. long, 2—5 cm. broad, trisect or tripartite or trifid, otherwise entire or the middle division again cleft or sparsely and coarsely serrate; all leaflets obtuse or subcuneate, more rarely quite cuneate at the base, subacute at the apex, glabrous, below subglaucous, nerves fine and scarcely prominent below; petioles semiterete or subterete, scarcely dilated at the base, 5—12 cm. long. Flowers solitary on the branches, terminal, large; peduncle strict, 1—6 cm. long. Bracts 3, inserted near the base of the calyx, in the same spiral with the calyx leaves and gradually passing into them, oblanceolate-subspatulate, the outermost 5—7 cm. long, sparsely incised or incisedly lobed, the innermost 4—5 cm. long quite entire, all of them again dilated at the base and glabrous. Sepals 5, herbaceous reticulately veined, 2—3 cm. long, inner ones a little smaller than the others, entire, glabrous, persistent, ultimately reflexed; the outermost oblanceolate conspicuously dilated at the base, the second from a broadish base long-acuminate, the third ovate long-acuminate, the fourth broad-ovate short-acuminate, the fifth suborbiculate with the shortly produced apex subtruncate. Petals 5—7 (—8?), membranous, traversed by much-branched nerves, broadly cuneate at the base, erose-sinuate at the margin, 7—8 cm. long, white with a rosy hue, with a large dark-purple spot near the base. Stamens numerous, gradually increasing in length inwards, the innermost projecting a little beyond the disc; filaments narrowly linear, coloured, outer ones about 4, innermost ones 10—17 mm. long anthers linear-oblong, apiculate, outer ones 2, inner ones 5—6 mm long.

Pistils 5, erect, about 2 cm. long, surrounded by the urceolate subglobose somewhat fleshy disc which is at first dentate at the apex and finally irregularly torn; ovaries ovoid-oblong, convex dorsally, ventrally nearly straight, attenuated upwards, covered with coarse brown hairs; stigma induplicate, veined, recurved, undulate, papillose along the edges, protruding from the disc. Follicles divergent, coriaceous, ovoid, tomentose.

Flowers in June.
Chumbi, near Tuk-chung (*King's collector!*).

Paeonia Moutan, sub-sp. *atava* differs from the typical *Paeonia Moutan* chiefly in the number of petals, which in the garden form are usually very numerous. The leaflets are smaller than those of the cultivated plant, but in this respect it stands between the latter and a variety from Japan. There appears to be no doubt about its growing wild in the Chumbi hills or of its being the ancestral form of the numerous garden varieties of *Paeonia Moutan*. From *Paeonia Delavayi*, Franchet, it is easily distinguished by the tomentose (not glabrous) carpels, and the ovate or ovate-oblong (not lanceolate or ovate-lanceolate) leaf-segments, which are not confluent.

PLATE 128. *Paeonia Moutan*, DC., subsp. *atava*. 1, annual shoot in flower; 2, head of immature follicles, discal envelope not yet burst; 3, inner stamen; 4, outer stamen; 5, carpel; 6, inner surface of one-half of the stigma; 7, hair from ovary, greatly magnified; 8, unripe seed; 9, innermost sepal.

PLATE 129.

TETRACERA GRANDIS, King in Journ. As. Soc. Bengal, for 1889, *pt.* 2, *p.* 363.

Nat. Ord. Dilleniaceæ.

A large tree. Young branches and inflorescence shortly velvety-tomentose. *Leaves* large, coriaceous, broadly elliptic, rarely slightly obovate, the apex truncate and minutely apiculate; the edges obscurely crenate or undulate toward the apex, entire below, recurved when dry; the base rounded or slightly narrowed: upper surface scabrous, lower minutely tomentose: nerves stout, 14 to 16 pairs, rather straight, erecto-patent; length of blade 8 to 11 in., width 5 to 6 in., petiole about ·7 in., stout. *Inflorescence* in little-branched, lateral or terminal panicles a foot or more long. *Flowers* shortly pedunculate. *Sepals* 5, broadly ovate, sub-acute, concave, ribbed and tomentose externally, ·5 in. long. *Petals* nearly as long as the sepals, but narrower, glabrous. *Anthers* with obcordate connective narrowed to the long slender filaments. *Follicles* with a slender curved beak.

Perak. Scortechini, No. 90*b*.

This species has as yet been collected only by the late Revd. Father Scortechini, whose specimens are moreover scanty, and none of them are in fruit.

PLATE 129. *Tetracera grandis*, King. 1, leaf; 2, inflorescence: *of natural size;* 3, flower with the petals removed: *slightly enlarged;* 4, flower, dissected; 5, anther; 6, two pistils: *much enlarged.*

PLATE 130.

WORMIA MELIOSMÆFOLIA, King in Journ. As. Soc. Bengal, for 1889, *pt.* 2, *p.* 365.

Nat. Ord. Dilleniaceæ.

A small tree, the young parts and leaf-petioles softly fulvous-tomentose. *Leaves* crowded near the apices of the branches, coriaceous, obovate-lanceolate to obovate-elliptic, acute or acuminate, entire or minutely and remotely serrate, base acute, glabrous or glaberulous above except the 14 to 18 pairs of bold spreading pubescent nerves, under surface minutely tomentose; length of blade 5 to 10 in.; breadth 3 to 4 in., petiole about 1 in. *Flowers* about 3 in. in diam., axillary, solitary, on slender tomentose peduncles 1 to 2 in. long, or in few-flowered, linear-bracteolate pedunculate racemes. *Sepals* 5, ovate-oblong, velvety-tomentose externally, glabrous internally. *Petals* 5, obovate, pale yellow, veined, wavy. *Stamens* indefinite, in several series nearly free; anthers linear, erect, opening by apical pores. *Pistils* about 12, with linear recurved stigmas, ovules numerous. *Follicles* with several compressed arillate seeds. *Dillenia meliosmæfolia*, Hook. fil. & Th. Fl. Br. Ind. I, 36.

Malacca, Perak.

Originally described as a *Dillenia* by Sir Joseph Hooker who had not seen the fruit.

PLATE 130. *Wormia meliosmæfolia*, King. 1, branch with solitary flower just opening; 2, branch with racemose flowers just opening; 3, fully expanded flower dissected; 4, flower after the petals have fallen off, showing the accrescent sepals; 5, ripe follicles: *of natural size;* 6, anther: *enlarged.*

PLATE 131.

COCCULUS KUNSTLERI, King in Journ. As. Soc. Bengal, for 1889, *pt.* 2, *p.* 28.

Nat. Ord. Menispermaceæ.

A glabrous climber. Young branches striate, pale. *Leaves* membranous, with long petioles, peltate, rotund, acute; nerves 9, radiating from the petiolar insertion, thin but prominent on the pale under surface; length of blade 3·25 to 4 in., breadth about 3 in., or less; petiole slender, terete, not dilated at the base, about 3 in. long. *Panicles* racemoid, in fascicles of 2 to 4 from flat warty tubercles on the stem, narrow, the lateral branches only about ·5 in. long, few-flowered. *Sepals* 6, 2-seriate, the outer smaller. *Petals* 6, rhomboid, smaller than the sepals. *Male flower;* stamens 6, each embraced by a petal; filaments free, clavate; anthers broad, 4-celled. *Female flower;* staminodes 6 or 0. *Ripe drupes* 1 to 1·25 in. long, and about ·7 in. broad, narrowly sub-obovoid, compressed; pericarp of a thin pulp; endocarp horny, narrowly horse-shoe-shaped, the edge boldly ridged, the sides with deep radiating grooves and the central part with a deep vertical hollow; embryo sausage-shaped, bent along the circumferential chamber of the endocarp.

Perak, Ulu Bubong; King's collector, Nos. 4417 and 10282.

This has the flower of *Cocculus*, but the fruit of *Stephania*. It comes nearest to the Indian *C. macrocarpus*, which has a similar though smaller fruit, and, like that species, would belong to Mier's genus *Diploclisia*. It must be near *D. pictinervis* of that author.

PLATE 131. *Cocculus Kunstleri*, King. 1, branch with leaves; 2, raceme-like panicles of male-flowers removed from the stem; 3, panicles with ripe fruit also from the stem; 4 and 5, seeds: *of natural size;* 6, male flower dissected, the six sepals being detached; 7, anther embraced by a petal; 8 anther: *enlarged.*

PLATE 132.

CYCLEA ELEGANS, King in Journ. As. Soc. Bengal, for 1889, *pt.* 2, *p.* 387.

Nat. Ord. Menispermaceæ.

Scandent; young branches spirally striate, puberulous, as are the petioles and panicles; otherwise glabrous. *Leaves* slightly peltate, membranous, shining on both surfaces, the reticulations minute, distinct, ovate to ovate-oblong, shortly acuminate the base rounded or cordate, 7-nerved (4 of the nerves minute); length of blade 3 to 4 in., breadth 1·5 to 2 in., petiole about 1 in. *Male* and *female panicles* sub-equal, slender, solitary, axillary, shorter than the leaves. *Male flowers* crowded, minute; *sepals* 4, connate into an inflated 4-lobed calyx. *Petals* 4, more or less connate into a 4-lobed corolla. *Anthers* 4, connate, crowning the staminal column, bursting transversely. *Female flower*: *sepal* 1, oblong. *Petal* 1, orbicular. *Ovary* 1; style short, 3-to 5-lobed, lobes radiating. *Drupe* pisiform, slightly compressed, style-scar subbasal; *endocarp* horse-shoe-shaped, dorsally tubercled, sides convex, 2-locellate, pulp thin. *Seed* curved; cotyledons slender, $\frac{1}{2}$-terete, appressed.

Perak; at elevations of from 1,500 to 2,000 feet; King's collector, Scortechini. A slender creeper 15 to 25 feet long: not common.

PLATE 132. *Cyclea elegans*, King. 1, flowering branch: *of natural size*; 2, section of seed; 3 and 4, embryo; 5 and 6, male flowers; 7, staminal column; 8, anthers: *enlarged*.

PLATE 133A.

CLEOME HULLETTII, King in Journ. As. Soc. Bengal, for 1889, *pt.* 2, *p.* 392.

Nat. Ord. Capparideæ.

A much-branched, sub-decumbent, small shrub; the stem striate, puberulous, and with a few short prickles in distant pairs. *Leaves* dimorphous; those of the lower part of the stem petiolate, trifoliolate, the leaflets obovate; those of the upper part simple, sessile, ovate; all pubescent and from ·5 to ·75 in. long. *Flowers* solitary, axillary, about ·5 in. in diam., on slender pedicels longer than the leaves. *Sepals* 4, ovate, spreading, much smaller than the petals. *Petals* 4, rotund, narrowly clawed. *Stamens* 6, the filaments longer than the anthers. *Ovary* sessile, oblong, style 0. *Capsules* terete, striate, glabrous, from 1 to 1·5 in. long; seeds large, muricate, the embryo curved.

Singapore, in dry place by roadsides.

This is allied to the Peninnsular Indian species *C. aspera*, Koen, and *C. Burmanni*, W. & A. but differs from both in its dimorphous leaves.

PLATE 133A. *Cleome Hullettii*, King. 1, branch in flower and fruit; 2, ripe capsule dehiscing: *of natural size*; 3, flower dissected; 4, seeds: *enlarged*.

CAPPARIS, Linn.

Trees or shrubs, erect, decumbent or climbing, unarmed, or with stipular thorns. *Leaves* simple, rarely 0. *Flowers* white or coloured, often handsome. *Sepals* 4, free, imbricate in 2 series, or 2 outer subvalvate. *Petals* 4, sessile, imbricate. *Stamens* indefinite, inserted on the torus at the base of the long gynophore. *Ovary* stalked, 1 to 4-celled; stigma sessile; ovules many, on 2 to 6 parietal placentas. *Fruit* fleshy, rarely bursting by valves. *Seeds* many, imbedded in pulp, testa crustaceous or coriaceous; cotyledons convolute.

PLATE 133B.

CAPPARIS GALLATLYI, King n. sp.

Glabrous, young branches terete, unarmed. *Leaves* membranous, oblong or elliptic-oblong, shortly acuminate, entire, the base cuneate; length 6 to 7·5 in., breadth 2 to 2·5 in., petiole ·25 to ·35 in. *Racemes* terminal, solitary 5 to 7·5 in. long, puberulous, with a few scattered subulate bracteoles, many-flowered. *Flowers* ·25 in. in diam., on slender puberulous pedicels ·4 in. long. *Sepals* 4, ovate, blunt, concave, pubescent. *Petals* slightly longer than the sepals, ovate-lanceolate, acute, veined, glabrous. *Stamens* 16; the anthers elliptic-oblong, about one fifth of the length of the filaments. *Ovary* ovoid, acute, about one-fourth the length of the gynophore, which is slightly shorter than the filaments, multi-ovulate. *Fruit* unknown.

Burmah: Moolar plain, G. Gallatly.

PLATE 133B. *Capparis Gallatlyi*, King. 1, flowering branch: *of natural size;* 2, flower; 3, the same with the stamens removed; 4, stamens: *enlarged.*

PLATE 134.

CAPPARIS LARUTENSIS, King in Journ. As. Soc. Bengal, for 1889, *pt.* 2, *p.* 393.

Scandent, the young branches and petioles densely covered with minute, rusty, sub-deciduous, tomentum. *Stem* sub-striate; prickles in pairs, short, hooked. *Leaves* glabrous, coriaceous, oblong-lanceolate, obtuse or retuse, the midrib prominent, the 5 or 6 pairs of nerves obscure; length 1 to 1·25 in., breadth ·4 in., petiole ·2 in. *Flower pedicels* solitary, glabrous, more than half as long as the leaves. *Flowers* ·75 in. in diam., white to pink. *Sepals* 4, free, in two series, decussate, ovate-rotund, concave. *Petals* 4, sessile, imbricate, obovate-oblong, obtuse, puberulous. *Stamens* about 30, inserted on the torus at the base of the gynophore. *Gynophore* slender, 1·5 in. long. *Ovary* ovoid, globular, apiculate, many-ovuled. *Fruit* globose with an apical beak, ·6 in. in diam. (unripe). Seeds several, imbedded in pulp, testa crustaceous, cotyledons convolute.

Perak, at Larut; King's Collector, No. 5103.

A woody climber, 30 to 40 feet long. The petals change from white to pink. Ripe fruit is unknown. This must be near C *erythrodasys*, Miq.

PLATE 134. *Capparis Larutensis*, King. 1, flowering branch; 2, branch with young fruit: *of natural size;* 3, flower dissected; 4, stamens; 5, disk gynophore and ovary: *enlarged.*

PLATE 135.

CAPPARIS SCORTECHINII, King in Journ. As. Soc. Bengal, for 1878, *pt.* 2, *p.* 394.

Scandent; young parts, and the inflorescence at all stages densely and minutely ferrugineous-tomentose; older branches with 1 or 2 striæ, glabrescent; thorns stipular, in pairs, much shorter than the petioles, hooked. *Leaves* coriaceous, broadly lanceolate, acuminate, much narrowed at the base, glabrous above and the nerves obsolete; under surface ferruginous-tomentose when young, but becoming glabrescent, the midrib and 6 pairs of nerves bold and prominent; length 5 to 8 in., breadth 2 to 3 in., (much smaller towards the end of the branches), petiole ·5 in. *Flowers* 1·5 in. in diam., on short lateral, leafly, bracteate, woody racemes. *Bracts* petiolate, ovate-acuminate, ·75 in. long, deciduous. *Sepals* 4, free, imbricate in 2 series, sub-rotund, concave, the outer pair tomentose externally. *Petals* pink, nerved, broadly obovate-elliptic, obtuse, the base cuneate, glabrous. Stamens about 50, inserted on the torus at the base of the long gynophore: *ovary* ovoid, blunt, stigma sessile; ovules numerous, on parietal placentas. *Fruit* globose, 3·5 to 4 in. in diam., the gynophore stout, transversely wrinkled, 2·5 in. long and ·6 in. in diam. *Seeds* compressed, ovoid, ·8 in long.

Batang Padang district in Perak. King's Collector No. 8083; Scortechini, 191.

The fruit of this has been only once collected. The species is a fine creeper, 15 to 20 feet long. It closely resembles *C. trinervia*, H. f. & Th. in many respects: but the leaves are not triple—but pinnate-nerved.

PLATE 135. *Capparis Scortechinii*, King. 1, flowering branch; 2, leaf from the lower part of the stem; 3, bract; 4, ripe fruit; 5, seed; 6, outer sepal; 7, petal: *of natural size*; 8 stamens: *enlarged*.

PLATE 136.

CAPPARIS CUCURBITINA, King in Jour. As. Soc. Bengal, for 1889, *pt.* 2, *p.* 395.

Scandent; branchlets finely striate, nearly glabrous; the thorns stipular, in pairs, hooked, very sharp, much shorter than the petiole. *Leaves* glabrous, shining, more or less broadly lanceolate or oblong-lanceolate, shortly acuminate, the base narrowed or rounded; main nerves 8 or 9 pairs, anastomosing in bold intramarginal arches, the secondary nerves bold as is the midrib, the reticulations distinct; length 5·5 to 7 5 in., breadth 1·75 to 2·25 in.; petiole under ·5 in., slender. *Flowers* in fascicles of 2 or 3, supra-axillary; the pedicils slender, more than 1 in. long, ebracteolate. *Sepals* ovate-lanceolate, acuminate, puberulous. *Petals* broadly elliptic, obtuse. *Stamens* about 20, the filaments unequal. *Ovary* on a short gynophore, narrowly elliptic, the stigma sessile, ovules numerous. *Fruit* cylindric, tapering to each end, the apex shortly beaked; when ripe orange-coloured, 3 in. long, and 1·5 in. in diam.; gynophore nearly ·75 in., pedicel 1·25 in., slender. *Seeds* ovoid, smooth, ·4 in. long.

Ulu Bubong, Perak. King's Collector, Nos. 10027 and 10795.

A creeper, 20 to 30 feet long; allied to *C. Finlaysoniana*, Wall. by its curious cucumber-like fruit, but with different leaves. Flowers have as yet been collected only in bud. Fully-developed flowers are still unknown.

PLATE 136. *Capparis cucurbitina*, King. 1, flowering branch with young leaves; 2, an adult leaf; 3, fruiting branch; 4, section of ripe fruit; 5, seeds: *of natural size*; 6, flower dissected; 7, anthers; 8, ovary; 9, section of ovary: *enlarged*. (*The drawings of the flower and its parts are all taken from buds—fully-developed flowers being as yet unknown.*)

PLATE 137.

CAPPARIS ANDAMANICA, King n. sp.

Glabrous, scandent; the branches finely striate, unarmed. *Leaves* coriaceous, shining, oblong or narrowly elliptic, acute, the base rounded, the edges slightly recurved when dry, midrib prominent, the 9—12 pairs of nerves very obscure; length of blade 3 to 4 in., breadth 1·25 to 1·5 in., petiole ·3 in. *Panicles* solitary, spreading, axillary, shorter than the leaves. *Flowers* under ·5 in. in diam., crowded at the extremities of the branchlets. *Sepals* ovate-rotund, concave, glabrous. *Petals* very thin, elliptic, obtuse. *Stamens* 8, the filaments equal. *Gynophore* shorter than the filaments; ovary conical. *Fruit* globular, slightly narrowed to the base, 1 in. in diam., glabrous, with 6 to 8 seeds immersed in scanty pulp.

South Andaman Island, near the beach; Kurz, King's Collector.

A species allied to *C. Luzoniensis*, Turcz. Bull. Soc. Mosc., 1854, II, p. 324.

Plate 137. *Capparis Andamanica*, King. 1, flowering specimen; 2, ripe fruit; 3, section of ripe fruit: *of natural size;* 4, flower; 5, the same dissected; 6, anthers; 7, pistil: *enlarged.*

PLATE 138.

Capparis ambigua, Kurz For. Flora Burmah, I, 65.

A large scandent shrub, the older branches armed with short sharp recurved thorns, the young parts puberulous. *Leaves* membranous, variable, broadly lanceolate to elliptic-oblong, obtuse or shortly acuminate, the base rounded, both surfaces glabrous; main nerves 8 to 12 pairs, spreading, indistinct; length 3 to 5 in., breadth 1·3 to 1·8 in., petiole ·3 in. *Panicles* terminal, lax, the flowers umbellulate on the ultimate branches. *Sepals* 4, concave, distichous; the outer pair orbicular, very concave; the inner pair rotund, smaller and, thinner than the outer and less concave. *Petals* 3 or 4, smaller than the sepals, obovate. thinner than the sepals. *Stamens* about 30: anthers ovate, much shorter than the filaments. *Gynophore* less than half as long as the filaments; ovary narrowly ovoid, acute, many ovuled. *Berry* elliptic, the apex shortly beaked, the base slightly narrowed, about ·7 in long, pulp scanty. *Seed* solitary, beaked.

South Andaman Island; Kurz, King's Collectors.

A species remarkable in the genus for its one-seeded fruit.

Plate 138. *Capparis ambigua*, Kurz 1, flowering branch; 2, branch with ripe fruit; 3, section of ripe fruit; 4, seed: *of natural size;* 5, flower dissected (s-sepals, p-petals); 6, anthers: *enlarged.*

Roydsia, *Roxb.*

Nat. Ord. Capparideæ.

Large unarmed woody climbers, branches spotted white. *Leaves* simple. *Flowers* yellow, racemed or panicled. *Calyx* 6-partite, segments 2-seriate, tips slightly imbricate. *Petals* 0. *Stamens* indefinite, inserted above the base of the short cylindric gynophore. *Ovary* ovoid, 3-celled from the prolongation of the placentas; styles 3, subulate, or single and undivided; stigmas small, terminal; ovules many, 2-seriate in the angles of the cells. *Fruit* fleshy, with a woody 3-valved 1-celled endocarp, 1-seeded. *Seed* erect, cotyledons fleshy, unequal, longitudinally folded, the larger embracing the smaller.

PLATE 139.

Roydsia Scortechinii, King in Journ. As. Soc. Bengal, for 1889, *pt.* 2, *p.* 397.

Nat. Ord. Capparideæ.

Scandent, glabrous, except the minutely pubescent inflorescence and sepals. *Leaves* membranous, elliptic or obovate-elliptic, shortly and abruptly acuminate, narrowed to the base; upper surface shining; the lower paler, the midrib and 6 pairs of arching main nerves prominent: length of blade 3·5 to 6·5 in., breadth 2 to 3 in.; petiole ·75 to 1·25 in., thickened in the upper half and bent in the middle. *Flowers* in terminal or axillary panicles or racemes, shortly pedicellate, ·25 in. in diam. *Sepals* 6, slightly imbricate in bud, united at their bases, linear-oblong, sub-acute, minutely tomentose on both surfaces, reflexed. *Stamens* 30; the filaments unequal, slender, compressed, united by their bases, anthers innate. *Pistil* as long as the stamens, the gynophore shorter than the ovary, puberulous. *Ovary* ovoid, 3-celled, ovules many, glabrous. *Style* twice as long as the ovary, cylindric; stigmas 3, sessile, ovate, small. *Ripe fruit* ovoid, smooth, yellow, 1·5 in. long and 1 in. in diam., endocarp membranous. *Seed* erect, the cotyledons fleshy.

Perak; Scortechini, King's Collector, Nos. 8464 and 4225: in open rocky places from 500 to 1,200 feet.

In his field note on No. 8464, the collector describes this as "a splendid creeper 80 to 100 feet long;" in that on No. 4225, he says, "a tree 40 to 50 feet high." Fr. Scortechini's specimens have no notes. From the flexuose appearance of the dried twigs, I believe this is a creeper, and not a tree. This and the last belong to the section of *Roydsia* characterised by having an undivided style, for which Sir J. D. Hooker (F. B. I. i. 409), proposes the sectional name of *Alytostylis*, but with an expression of doubt as to whether it should not be separated off as a genus. To this group belongs also the Philippine species *R. floribunda*, Planch.

PLATE 139. *Roydsia Scortechinii*, King. 1, flowering branch; 2, fruiting branch: *of natural size;* 3, flower seen from below; 4, flower seen from above; 5, flower dissected, 6, anthers: *enlarged.*

PLATE 140A.

ROYDSIA FASCICULATA, *King n. sp.*

Nat. Ord. Capparideæ.

Young branches under surfaces of leaves and the inflorescence softly fulvous-puberulous, the older branches glabrous and lenticellate. *Leaves* membranous, broadly oblanceolate, abruptly and shortly acuminate, narrowed at the base; upper surface glabrous except the pubescent midrib, the lower sparsely pubescent, the midrib and 7 to 9 pairs of sub-horizontal nerves prominent; length of blade 3 to 4·5 in., breadth 1·25 to 1·75 in., petiole ·7 in., straight. *Racemes* 3—4 in. long, in fascicles of 2—3, axillary or from the axils of fallen leaves. *Flowers* shortly pedicellate, ·25 in. in diam. *Sepals* 6, oblanceolate, not united at their bases, velvetty-tomentose on both surfaces. *Stamens* about 35, the filaments flat, united near their sparsely hairy bases; anthers linear-oblong, innate. *Pistil* slightly longer than the stamens; gynophore ovary and style about equal in length, the two former densely tomentose; the style undivided, sub-glabrous; stigmas minute, ovary 3-celled.

Banks of Youngaleen River in Burmah; G. Gallatly, No. 499.

Described by Mr. Gallatly as a shrub. Collected only once, and not in fruit. This belongs to Hooker's sub-genus *Alytostylis*, another species of which (viz., *R. parviflora*, Griff.) is also a Burmese plant. But the latter is very distinct from this.

PLATE 140A. *Roydsia fasciculata*, King. 1, flowering branch: *of natural size;* 2, flower; 3, the same dissected; 4, anthers; 5, pistil; 6, section of the same: *enlarged.*

ALSODEIA, Thouars.

Nat. Ord. Violarieæ.

Trees or shrubs. *Leaves* alternate (rarely opposite), distichous; secondary nerves often numerous and parallel. *Stipules* rigid. *Flowers* small, axillary or terminal, solitary, fascicled, cymose or racemose, regular; peduncles with many bracts. *Sepals* 5, subequal, rigid. *Petals* 5, subequal, sessile. *Stamens* 5, inserted inside or upon an annular disk; with long or short often broad dorsal membranous connectival appendages, the cells of the anthers sometimes with apical linear processes. *Ovary* ovoid, style straight, stigma terminal, ovules few or many. *Capsule* 3-valved, few-seeded. *Seeds* glabrous in the Indo-Malayan species.—Distrib. Species about 50, chiefly tropical American.

Sect. I. PROSTHESIA Bl. (genus). *Anthers with a subulate appendage from the apex of each cell, and a broad (usually dorsal) appendage from the connective.*

PLATE 140B.

ALSODEIA MEMBRANACEA, King in Journ. As. Soc. Bengal, for 1889, *pt.* 2, *p.* 402.

A tree or shrub, the young branches shortly pubescent or tomentose. *Leaves* thin when dry, obliquely obovate-elliptic, shortly and rather abruptly acuminate, serrate, the base narrowed, rather unequal-sided, both surfaces glabrous, except the midrib and 6 to 8 pairs of pubescent arching nerves, the reticulations wide; length 5 to 7 in., breadth 2·5 to 3 in., petiole pubescent, ·5 in. long; stipules subulate, pubescent, ·2 in. long. *Racemes* axillary, condensed, sessile, shorter than the petioles, few-flowered. *Sepals* 5, unequal, the outer 3 rather larger than the inner, all broadly ovate-obtuse, pubescent externally. *Petals* 5, smaller than the sepals, ovate-oblong, sub-acute, the margins ciliolate with a few adpressed hairs on the back. *Stamens* 5, glabrous, the filaments very short, rising from a fleshy 5-lobed disc. *Anthers* broadly cordate or sub-reniform, with 2 very small subulate processes from the apices of the cells and a large dorsal, cordate-acuminate, brown, membranous appendage (from the connective) as wide as the anther. *Ovary* sessile, ovoid, villose; style cylindric, glabrous, stigma cup-shaped. *Capsule* globular, glabrous, the valves in dehiscence blunt: seeds sub-globular with a beaked caruncle.

Perak, at low elevations. King's Collector, Scortechini.

A shrub or small tree. This comes near *A. dasycaula*, Miq. in externals; but has fewer-nerved more glabrous leaves.

PLATE 140B. *Alsodeia membranacea*, King. 1, branch with flower and fruit; 2, capsule dehiscing; 3, seeds: *of natural size;* 4, flower bud; 5, flower seen from below; 6, flower seen from above; 7, flower dissected; 8, anther seen from behind; 9, anther from the front: *enlarged.*

NOTE.—*The specimen here figured has only young leaves: adult leaves are considerably larger.*

PLATE 141.

ALSODEIA KUNSTLERIANA, King in Journ. As. Soc. Bengal, for 1889, *pt.* 2, *p.* 401.

A glabrous shrub or small tree; the branchlets striate, sometimes lenticellate. *Leaves* subcoriaceous, oblong-lanceolate, acuminate or caudate-acuminate, sometimes minutely and obscurely serrulate, very much narrowed to the base; upper surface smooth and shining; lower dull, rough from the numerous short transverse secondary nerves and 14 to 16 pairs of prominent ascending main nerves; the midrib bold and subrugose; the reticulations minute and distinct; length of blade 6 to 10 in., breadth 2·25 to 3 in., petiole ·25 to ·5 in. *Stipules* lanceolate, ·25 in. long. *Flowers* in axillary, often crowded, fascicles or very short racemes of 3 to 8, bracteolate, the pedicels shorter than the leaf-petioles. *Sepals* ovate, obtuse, imbricate, shorter than the petals, strongly nerved, the edges ciliate. *Petals* erect, the tips not reflexed, ovate-acute, rigid, the edges ciliate. *Stamens* with short flat filaments, each inserted into the apex of a lobe of the deeply 5-lobed disc. *Anthers* broad, adpressed to the ovary, each with 2 linear anterior appendages from the cells and one large dorsally-attached halbert-shaped membranous posterior appendage from the connective, the latter appendages conniving into a cone round the upper part of the ovary. *Ovary* sessile, ovoid-conic; the style exserted, cylindric. *Capsules* ovoid, glabrous, shining, smooth, ·5 in. long, dehiscing into three narrow compressed pointed valves; *seeds* one in each valve, ovoid, white, shining.

Singapore; Wallich, King's Collector. Perak; Scortechini, King's Collector; at low elevations.

There are two kinds of flowers in this plant—(*a*) those with pedicels as long as the flower; (*b*) those with pedicels shorter than the flower. In the former the anthers are perfect, and the ovaries produce seed. The flowers are thus truly hermaphrodite. In the latter the anthers have no pollen, but the ovaries are fruitful: they are virtually unisexual. The species is allied to *A. Wallichiana*, but differs from that species in its much more acuminate rougher leaves and also in its capsules and seeds.

PLATE 141. *Alsodeia Kunstleriana*, King. 1, branch with short-stalked flowers; 2, fascicles of long-stalked flowers; 3, ripe capsules: *of natural size*; 4, long-stalked flower; 5, the same dissected; 6, stamens of the same; 7, back view of a single anther; 8, front view of the same; 9, section of ovary of the same: 10, short-stalked flowers; 11, anthers of short-stalked flower: *all enlarged.*

PLATE 142A.

ALSODEIA HOOKERIANA, King in Journ. As. Soc. Bengal, for 1889, *pt.* 2, *p.* 402.

A small glabrous tree, the branchlets lenticellate. *Leaves* membranous, shining, shortly petiolate, elongate-oblanceolate or lanceolate, apex shortly and rather bluntly acuminate, entire or remotely serrulate, gradually narrowed below the middle to the base; nerves 7 to 9 pairs, arching, slightly prominent; length 4 to 8 in., breadth 1·25 to 2 in., petiole ·15 to ·25 in.; stipules ovate, only ·1 in.; long. *Racemes* axillary, and on the older branches from the axils of fallen leaves, numerous, rather dense when young, afterwards sparse and open, from ·75 to 1·5 in. long, bracteoles linear, deciduous, pedicels as long as or longer than the flowers. *Sepals* ovate, equal, pubescent or glabrous. *Petals* lanceolate with linear blunt apex, longer than the sepals, glabrous or pubescent along the midrib externally. *Stamens* glabrous, the filaments as long as the rather deep disc. *Anthers* broadly ovate, the base cordate, almost sub-reniform, the cells each with an apical point and with a broad membranous ovate acute dorsal appendage wider than the anther. *Ovary* sessile, pubescent; the style cylindric, glabrous; the stigma cup-shaped, truncate. *Capsule* globular, obtusely angled, glabrous, reticulate, ·8 in. long; the valves unequal, obtuse, compressed, sub-falcate: seeds sub-globose, pale, minutely mottled at the apex, the base with a papillate pitted caruncle.

Perak; at low elevations, Scortechini, Wray, King's Collector.

A tree from 20 to 30 feet in height; readily distinguished by its open, comparatively long, racemes. This closely resembles Blume's *Prothesia Javanica*.

PLATE 142A. *Alsodeia Hookeriana*, King. 1, flowering branch; 2, branch with flowers and fruits in various stages: *of natural size;* 3, flower seen from below; 4, flower seen from above; 5, flower dissected; 6, anthers and their disk; 7, anther, front view; 8, anther, back view; 9, ovary and style: *enlarged.*

PLATE 142B.

ALSODEIA WRAYI, King in Journ. As. Soc. Bengal, for 1889, *pt.* 2, *p.* 403.

A sub-glabrous shrub, the branchlets with pale brown puberulous bark, rarely lenticellate. *Leaves* membranous, glabrous, shining, shortly petiolate, oblanceolate, shortly acuminate, distinctly serrulate, narrowed to the base, length 3·5 to 4·5, rarely 6 to 7 in., breadth 1 to 2 in., petiole ·1 to ·2 in.; stipules linear, only ·1 in. long. *Racemes* very short, crowded, axillary or extra axillary, ·25 in. long; bracteoles broadly ovate, pubescent. *Sepals* lanceolate, tomentose externally. *Petals* oblong, obtuse, thickened and tomentose along the midrib. *Stamens* from the inside of a disc which is as deep as the filaments are long. *Anther* ovate-cordate, with a dorsal, broadly ovate-acute, membranous appendage as broad as itself, and a terminal apical process from each cell. *Ovary* sessile, densely villous as is the base of the cylindric style; stigma sub-capitate. *Capsule* minutely fulvous-velvetty when young, glabrous when old, globular-obovoid with obtuse angles, 1·2 in. or more long and 1 in. in diam.; the valves in dehiscence compressed, blunt. *Seeds* ovoid, brown, mottled, with sub-apical papillate pitted caruncle.

Perak, at low elevations; Scortechini, Wray, King's Collector.

A shrub 8 to 10 feet high. In respect of leaves very like *A. Hookeriana*, but smaller. The very short racemes, more hairy flowers and larger velvetty capsules distinguish it, however, from that species.

PLATE 142B. *Alsodeia Wrayi*, King. 1, flowering branch; 2, ripe fruit; 3, section of ripe fruit; 4, seeds: *of natural size;* 5, flower dissected; 6, anthers and pistil; 7, front view of anther; 8 back view of anther; *enlarged.*

PLATE 143A.

ALSODEIA CINEREA, King in Journ. As. Soc. Bengal, for 1889, *pt.* 2, *p.* 403.

A glabrous shrub or small tree, the branchlets whitish, sparsely lenticellate. *Leaves* membranous, elliptic-ovate or lanceolate, sometimes oblanceolate, acuminate, narrowed at the base, serrulate, pale when dry; nerves 8 to 10 pairs, slightly prominent below; length 4 to 6 in., breadth 1·5 to 2·5 in., petiole ·2 to ·4 in.; stipules scarious, pale, ovate-acute, striate, puberulous, ·25 in. long, deciduous. *Racemes* terminal, 2 to 6 in. long, bearing numerous 2-to 5-flowered cymules; bracts broadly ovate, scarious, concave, striate. *Sepals* broadly ovate, ciliolate. *Petals* oblong, obtuse, the apex undulate erose or toothed, edges ciliolate. *Stamens* from the edge of a fleshy disc; filaments very short, glabrous; anthers ovate, pilose near the base, with a broadly ovate appendage from the middle of the back curving over the apex, the cells divergent at the apex and each with a subulate terminal appendage. *Ovary* sessile, glabrous, globose, grooved: Style cylindric, with a few white adpressed hairs; stigma obliquely truncate, cup-shaped.

Capsules obovoid, bluntly angled, glabrous, reticulate, ·75 in. long, their valves blunt; seeds globose with an ovoid beaked hilum, pale, smooth.

Perak, at low elevations, King's Collector.

Var. *hirsutiflora*, King. *Sepals* tomentose externally, filaments sparsely villous, disc small; the cymules larger and the bracteoles longer and narrower than in the typical form.

Perak; Changkat Jerin. L. Wray, junior.

The whole plant when dried has a characteristic grey colour, and from this circumstance I have given its specific name.

PLATE 143A. *Alsodeia cinerea*, King. 1, flowering branch; 2, fruits; 3, fruits dehiscing; 4 and 5, seeds: *of natural size*; 6, flower dissected; 7, anther, front view; 8, anther, back view; 9, ovary and style: *enlarged*.

SECT. II. PENTALOBA. *Anthers with a broad, usually terminal, appendage from the connective; but none from the cells.*

PLATE 143B.

ALSODEIA FLORIBUNDA, King in Journ. As. Soc. Bengal, for 1889, *pt.* 2, *p.* 406.

A shrub or tree, the young branches minutely fulvous-tomentose. *Leaves* membranous, shortly petiolate, oblong-lanceolate, ovate-lanceolate, sometimes elliptic, acute or acuminate, more or less obscurely serrulate; the base rounded, rarely acute; upper surface glabrous except the pubescent midrib and nerves; under surface minutely and softly tomentose, the midrib and 14 to 16 pairs of rather straight nerves and the transverse secondary nerves prominent; length 4·5 to 7 in., breadth 1·5 to 2·5 in., petiole ·1 to ·2 in.; stipules lanceolate, pubescent on the midrib, ·25 in. long. *Cymes* axillary and terminal, on peduncles 1 to 1·5 in. long, much branched, dichotomous, spreading, many-flowered; bracteoles oblong, obtuse, pubescent. *Sepals* unequal, the outer 3 ovate-rotund, the inner 2 ovate, all obtuse and pubescent. *Petals* ovate-oblong, sub-acute, longer than the sepals, the apices usually reflexed. *Stamens* from a deep, puberulous, lobed disc; filaments expanded and pilose towards the apex, contracted and glabrous below; anthers elongate-ovate, with a single connectival ovate terminal appendage. *Ovary* sessile, villous-tomentose; style cylindric, puberulous; stigma truncate, cup-shaped. *Capsule* ovoid, obtusely angled, adpressed-pubescent, ·35 in. long, the valves blunt; seeds sub-globose, angled; caruncle long, narrow.

Perak, at low elevations; very common. Distrib. Sumatra; Lampongs, Forbes, 1719; Padang, Beccari, P. S. 683.

Usually a tree, and sometimes attaining the height (*fide* Kunstler) of 70 feet. But also, according to the same collector, found as a shrub 6 to 8 feet high. This is allied to the Burmese species *A. mollis* H. f. and Th., which, however, besides having the anthers of a *Prosthesia*, has much smaller cymes, and broader bracteoles and sepals.

PLATE 143B. *Alsodeia floribunda*, King. 1, flowering branch; 2, inflorescence with fruits in various stages: *of natural size*; 3, seed; 4, flower dissected; 5, stamens and their disc; 6 & 7, stamen, front and back views: *enlarged*.

PLATE 144.

ALSODEIA SCORTECHINII, King in Journ. As. Soc. Bengal, for 1889, *pt.* 2, *p.* 405.

A small glabrous tree, the branchlets usually pale brown. *Leaves* membranous, shortly petiolate, obliquely elliptic-lanceolate or oblanceolate, shortly and bluntly acuminate, irregularly serrulate; main nerves about 12 or 13 pairs, rather bold; secondary nerves transverse, slightly prominent below; length 7 to 9 in., breadth 2 to 3 in., petiole ·2 in. *Racemes* sessile, about ·5 in. long, several together, axillary or extra-axillary, about 3-to 5-flowered, with ovate bracteoles. *Flowers* pedicellate. *Sepals* puberulous, broadly ovate, much shorter than the petals. *Petals* 5, lanceolate, with long bluntly acuminate exserted apices. *Stamens* glabrous, shorter than the petals; the filaments twice as long as the anthers, slender, rising from a deep, 5-lobed, disc; the anthers short, ovate, with a single very small terminal appendage; ovary sessile, globose, glabrous, warted; style long, cylindric, glabrous or puberulous. *Ripe capsule* globular, pointed, rather more than ·5 in. long, glabrous, lenticellate; valves compressed, pointed. *Seeds* 2 in each valve, sub-rotund, whitish, carunculate.

Perak; King's Collector, Scortechini, Wray; at low elevations.

A large shrub or tree 20 to 25 feet high. Externally this much resembles *A. Maingayi*, but the flowers, and especially the anthers, differ much.

PLATE 144. *Alsodeia Scortechini*, King. 1, flowering branch; 2, ripe fruits: *of natural size;* 3, seed; 4, flower dissected; 5, the stamens and their disc removed from the same; 6, stamens, back and front view: *enlarged.*

PLATE 145.

ALSODEIA CONDENSA, King in Journ. As. Soc. Bengal, for 1889, *pt.* 2, *p.* 405.

A glabrous tree; the older branchlets pale, lenticellate. *Leaves* membranous, shortly petiolate, inequilateral, elliptic to elliptic-oblong, sub-acute, sub-entire, gradually narrowed below the middle to the acute slightly unequal base; shining above, dull beneath and darker except the midrib and 13 to 15 pairs of prominent, sub-erect, pale main nerves; secondary nerves transverse; length 8 to 14 in., breadth 3 to 4·5 in., petiole ·25 to ·35 in.; stipules subulate, ·35 to ·5 in. *Panicles* axillary, crowded, much branched, spreading, 1 to 2·5 in. long (longer in fruit), puberulous or glabrescent; the bracteoles numerous, ovate, acute. *Sepals* unequal; the outer 2 or 3 larger, rotund; the inner 2 or 3 ovate, pubescent on the back. *Petals* ovate, a little longer than sepals, rhomboid, with pale edges, villous on the back externally and along the midrib internally. *Stamens* glabrous, the filaments rather short, from a fleshy disc; anther cordate, with a single terminal minute white ovate membranous appendage from the connective. *Ovary* sessile, globose, glabrous. Style cylindric, stigma cup-shaped. *Capsule* ovoid, pointed, glabrous, not lenticellate: valves compressed, pointed; seeds sub-globular, carunculate.

Perak, Scortechini, King's Collector; at low elevations.

A tree 30 to 40 feet high, approaching *A. Scortechini* in externals, but with different flowers.

PLATE 145. *Alsodeia condensa*, King. 1, flowering branch; 2, panicles with ripe fruit: *of natural size;* 3, seed; 4, flower, dissected; 5, anthers with their tube; 6, anthers, back and front view; 7, pistil: *enlarged.*

PLATE 146A.

ALSODEIA CAPILLATA, King in Journ. As. Soc. Bengal, for 1889, *pt.* 2, p. 407.

A small shrub, the young branches rufous-tomentose. *Leaves* membranous, shortly petiolate, lanceolate, acuminate, the edges serrulate, the base acute; upper surface glabrous except the pubescent nerves and midrib, lower rufous-pubescent; the nerves about 12 pairs, bold, as are the transverse veins; length 4 to 6 in., breadth 1·5 to 1·75 in., petiole ·2 in.; stipules lanceolate, pubescent externally. *Flowers* in small, sub-sessile, 3- to 5-flowered axillary cymes. *Sepals* narrowly oblong, obtuse, tomentose externally. *Petals* linear-oblong, the apex sub-acute and reflexed, hairy along the midrib externally. *Stamens* alternating with the lobes of a deep, 5-lobed, glabrous disc; filaments slender, glabrous, longer than the anthers. *Anthers* small, ovate, each with an ovate acute small terminal appendage. *Ovary* sessile, globular, villous; style long, cylindric, sub-villous; stigma truncate, cup-shaped. *Capsule* ·5 in. long, rusty-pubescent externally and densely covered with unbranched, often hooked, soft, pubescent spines about ·15 in. long and not felted. *Seeds* ovoid, smooth, pale, with dark semi-circumferential band, and an oblong caruncului.

Laroot in Perak, King's Collector, No. 2462. A small bush 4 to 8 feet high.

This comes near *A. echinocarpa* and *A comosa*, but differs notably in its flowers and seeds.

PLATE 146A. *Alsodeia capillata*, King. 1, flowering branch; 2, ripe fruit dehiscing: *of natural size;* 3, flower: *slightly enlarged;* 4, flower dissected; 5, flower with calyx and corolla removed; 6, two anthers with part of the disc (*one of the anthers turned round to show its back*); 7, ovary and style: *enlarged.*

PLATE 146B.

ALSODEIA COMOSA, King in Journ. As. Soc. Bengal, for 1889, *pt.* 2, *p.* 407.

A shrub or small tree, the young branches densely ferruginous-tomentose. *Leaves* membranous, sub-sessile, oblong-oblanceolate, caudate-acuminate, serrulate, the base narrowed; upper surface glabrous; the lower pubescent, especially on the prominent midrib and 14 to 16 pairs of lateral nerves; length 5·5 to 7·5 in., breadth 1·5 to 2·5 in., petiole 2 in.; stipules subulate, ·3 in. long. *Flowers* in dense axillary bracteolate glomeruli. *Sepals* ovate, obtuse, tomentose. *Petals* lanceolate, acuminate, pubescent externally, and (like the sepals) with an apical tuft of hairs, glabrous internally. *Stamens* from a short minutely toothed glabrous disc, the filaments longer than the anthers: anthers narrowly ovate, each with a small rounded terminal appendage from the connective. *Ovary* elongate, sparsely villous; style pubescent; stigma truncate, cup-shaped. *Capsule* ·5 in. long flocculent-tomentose, densely covered with unbranched, subulate, soft, pubescent spines about ·5 in. long, not felted. *Seeds* pale, ovoid, smooth, with sub-terminal papillate caruncle.

Perak, Wray, Nos. 3299 and 1254; King's Collector, Nos. 406 and 554.

PLATE 146B. *Alsodeia comosa*, King. 1, flowering branch; 2, glomerule with flowers and young fruit; 3, ripe fruit dehiscing: *of natural size;* 4, seeds: *slightly enlarged;* 5, flower dissected; 6, anthers and disk; 7, anthers front and back; 8, pistil: *enlarged.*

HYDNOCARPUS, Gærtner.

Nat. Ord. Bixineæ.

Trees. *Leaves* alternate, serrate or entire, transverse veinlets numerous, stipules deciduous. *Flowers* solitary, or in irregular axillary few-flowered racemes or fascicles, monœcious or diœcious. *Sepals* 5, equal or unequal, imbricate in bud. *Petals* 5, with a scale opposite each. FL. ♂; *Stamens* 5—20; anthers reniform, connective broad. *Ovary* 0 or rudimentary. FL. ♀; *Stamens* as in the ♂ but without pollen, or reduced to staminodes. *Ovary* 1-celled; stigmas 3—6, sessile or subsessile, spreading, dilated, lobed; ovules many, on 3—6 parietal placentas. *Berry* globose, many-seeded, rind hard. *Seeds* many, imbedded in pulp; testa crustaceous, striate; albumen oily; cotyledons very broad, flat. Distrib. Species about 12, tropical Asiatic.

PLATE 147.

HYDNOCARPUS NANA, King in Journ. As. Soc. Bengal, for 1890, *pt.* 2, *p.* 118.

A shrub or small tree; the branches and young shoots glabrous or (var. *pubescens*) pubescent. *Leaves* subcoriaceous, from obovate-lanceolate to oblong-lanceolate, inequilateral, sub-falcate, shortly acuminate, remotely and minutely mucronate-serrulate, narrowed and unequal at the base, shining and glabrous except the midrib and nerves which, on both surfaces, are usually more or less pubescent; nerves 5 to 8 pairs, spreading or sub-erect, thin but prominent beneath; length 2·5 to 5 in., breadth ·75 to 2·5 in., petiole ·25 to ·35 in.; stipules persistent, linear-lanceolate, pubescent, about as long as the petioles. Male inflorescence small, supra-axillary, 1- to 4-branched, uniparous, tomentose, bracteolate, cymes not much longer than the petioles, flowers ·25 in. in diam. *Sepals* 5, rotund, the 3 external slightly imbricate, pubescent; the 2 inner much imbricate, glabrescent. *Petals* 5, smaller than the sepals, fleshy, with long white silky hairs externally, and each internally with a small oblong scale. *Filaments* short, thick, sericeous, the connective reniform; the anther cells small, remote from each other. Ovary 0. *Female flowers* solitary, supra-axillary, on glabrous pedicels ·5 in. long. *Sepals* and *petals* as in the male, stamens without pollen; ovary ovoid, tomentose; stigmas 3, large, flat, bifid, reflexed. Fruit on a pedicel ·5 in. long, solitary, axillary, depressed-globular, minutely rugose, and velvetty tawny-tomentose; about 1 in. in diam. or less; pericarp dry, thin. *Seeds* 3 or 4, plano-convex, ·5 in. long.

Penang, Curtis, No. 854: Perak; King's Collector, Scortechini, Wray.

This varies considerably as to size of leaf and fruit and in the amount of pubescence. In some specimens of the male plant the leaves towards the apices of the branches are much reduced in size. The form which has larger, more pubescent leaves may be separated as a variety, and farther acquaintance with it may prove that it is separable as a species.

PLATE 147. *Hydnocarpus nana*, King. 1, branch with male flowers; 2, ripe fruit; 3, section of the same; 4, seed: *of natural size*; 5, male flower seen from below; 6, male flower from above; 7, male flower, dissected; 8, stamens: *enlarged*.

PLATE 148.

HYDNOCARPUS CURTISII, King in Journ. As. Soc. Bengal, for 1890, *pt.* 62, *p.* 119.

A glabrous shrub or small tree. Young branches slender, pale brown when dry. *Leaves* coriaceous, shining on both surfaces, oblong-lanceolate, rarely ovate, slightly inequilateral, gradually narrowed to the acuminate apex; the base unequally narrowed, rarely rounded; nerves 9 to 11 pairs, thin, spreading; reticulations obscure on the upper surface; length 5 to 12 in., breadth 2·25 to 3 in.; petiole less than ·5 in. thick. *Male flowers* in small, axillary, branched, bracteolate, uniparous cymes, ·75 to 1 in. in diam.; pedicels scurfy-tomentose, ·75 in. long. *Sepals* reflexed, ovate, blunt, imbricate, pale, minutely pubescent, shorter than the petals. *Petals* 5, narrowly oblong, blunt, concave at the apex, ·65 in. long, glabrous; the gland nearly as long, linear, ciliate at the apex. *Anthers* 5, longer than the filaments, broadly ovate, cordate at the base. Ovary 0 or rudimentary. *Female flowers* on shorter, grooved, pedicels; ovary elongate-ovoid, tawny-tomentose; the stigmas 3, fleshy, bifid, spreading. *Fruit* on a stout pedicel nearly ·5 in. long, globose, with long apical papilla, minutely rugose and velvetty, vertically ridged, the stigmas persistent; nearly 1·5 in. long and 1 in. in diam. Seeds few, plano-convex, ·4 in. long.

Penang, Curtis, 800, 1534. Perak; King's Collector, Scortechini.

No specimen that I have seen has female flowers showing anything besides the ovary. Complete female flowers are much wanted.

PLATE 148. *Hydnocarpus Curtisii*, King. 1, flowering branch; 2, ripe fruit; 3, seed: *of natural size*; 4, flower dissected; 5, anthers, front and back view: *enlarged*.

PLATE 149.

HYDNOCARPUS CUCURBITINA, King in Journ. As. Soc. Bengal, for 1890, *pt.* 2, *p.* 120.

A tree 60 to 80 feet high; very young branches and leaves with minute ferruginous mealy tomentum; otherwise glabrous. *Leaves* thinly coriaceous, slightly inequilateral and contracted at the base on one side, eliptic-oblong, tapering to either end, the apex with a short rather blunt acumen, the edge very slightly recurved when dry; both surfaces, but especially the lower, shining and with the tranverse veins and minute reticulations very distinct; main nerves 5 to 6 pairs, sub-erect, thin; length 3·5 to 5 in., breadth 1·5 to 2·25 in., petiole ·25 in. *Cymes* diœceous (the female flowers few), axillary, three times as long as the petioles, bracteolate, 3- to 6-branched. *Male flowers* about ·3 in. in diam. on pedicels ·4 in. long. *Sepals* broadly ovate, blunt, pubescent-tomentose externally. *Petals* ovate-rotund, glabrous, thin, each with a fleshy scale with white ciliate edges and nearly as long as itself, but not so broad. *Anthers* ovate-cordate, glabrous; the filaments short, conical; *Ovary* rudimentary, sericeous. *Female flowers* like the males, but on slightly shorter pedicels and with smaller barren stamens. *Ovary* cylindric, densely sericeous-tomentose; *stigmas* elongate, fleshy, bifid at the apex, not reflexed when young. *Fruit* narrowly obovoid, cylindric, mamillate at the apex and contracted at the base; minutely tomentose, smooth, dark-brown when ripe and from 3 to 5 in. long; carpophore and pedicel about ·5 in. each, or more. *Seeds* one or two, obovoid, smooth, about 1 in. long.

Perak, up to elevations of 1,000 feet. Common.

Distinguished from every hitherto described species of this genus by its elongate cucumber-shaped fruit. The scales of the petals are also much larger and broader than is usual in *Hydnocarpus*.

PLATE 149. *Hydnocarpus cucurbitina*, King. 1, branch with male flowers; 2, ripe fruit; 3, seed: *of natural size;* 4, male flower dissected; 5, rudimentary pistil of male flower; 6, anthers of male flower; 7, ovary and styles from female flower after fertilisation, one of the stigmas having fallen off, and the after two having became deflexed: *enlarged.*

PLATE 150.

HYDNOCARPUS WRAYI, King in Journ. As. Soc. Bengal, for 1890, *pt.* 2, *p.* 121.

A small sub-glabrous tree. Young branches with pale brown, minutely lenticellate, puberulous bark. *Leaves* sub-coriaceous, elliptic, shortly and abruptly acuminate, the edge slightly recurved when dry; the base rounded, sometimes narrowed and unequal; the reticulations on both surfaces very prominent; upper surface glabrous, shining, minutely pustulate when dry; the lower of a pale brown when dry, glabrous except the puberulous midrib and 8 to 9 pairs of bold sub-erect nerves; length 8 to 10 in., breadth 3·5 to 4 in.; petiole less than ·5 in., stout. *Male flowers* nearly ·5 in. in diam., in very minute, axillary, pedicelled, few-flowered cymes. *Sepals* 5, slightly imbricate, rotund, pubescent, larger than the petals. *Petals* 5, of the same shape as the sepals, but smaller, each with a fleshy roughly cuneate scale the apex of which is irregularly toothed and ciliate. *Stamens* 15, the filaments glabrous, much thickened at the base; anthers broadly ovate, cordate. *Female flowers* unknown. *Fruit* narrowly ovoid, tapering at both ends, often 3 in. long. and 1·75 in. in diam., minutely fulvous-velvetty; the apical mamilla ·75 in. long with its top depressed and crowned by the 3 fleshy bifid stigmas; one-celled, several-seeded. *Pedicel* short, stout. *Seeds* embedded in a little pulp, elongate, plano-convex, ·75 in long.

Perak. King's Collector, No. 3800; Wray, No. 2608.

This species has more stamens than are usual in the genus *Hydnocarpus*. In this respect it appears to form a connecting link with *Taraktogenos:* but in shape the anthers do not agree with those of that genus.

PLATE 150. *Hydnocarpus Wrayi*, King. 1, leaf-twig; 2, ripe fruit; 3, section of ripe fruit; 4, seed: *of natural size;* 5, male flower; *slightly enlarged;* 6 & 7, sepals; 8, petal with its scale; 9, stamens of male flower; *enlarged;* 10, two stamens: *much enlarged.*

PLATE 151.

HYDNOCARPUS ILICIFOLIA, King, n. sp.

A small tree; the young branches pale, striate. *Leaves* coriaceous, oblong, acuminate, the edges remotely but sharply serrate, the base slightly cuneate; main nerves 7 pairs, curving, faint; the reticulations distinct; length 3·5 to 6 in., breadth 1·25 to 2·25 in., petiole ·3 in. *Male flowers* in few-flowered axillary fascicles, not much longer than the petioles, the buds depressed-globular, the pedicels very short. *Sepals* 4, in decussate pairs, very concave and much imbricate, rotund. *Petals* 4, sometimes 8, smaller than the sepals, erose, the gland large and sub-quadrate. *Stamens* 20; the anthers ovate, longer than the short, stout, pubescent filaments. *Female flowers* unknown. *Fruit* globular, minutely rusty, velvetty-pubescent, 1·5 in. in diam., containing several sub-ovoid angled seeds.

Kedah: Curtis No. 2671. Langkani: Curtis No. 2603. Distrib. Java (Preanger Province), Forbes No. 1159.

I have seen no fully expanded male flowers of this and no female flowers. The species is, however, a very distinct one.

PLATE 151. *Hydnocarpus ilicifolia*, King. 1, branch with male flowers in bud; 2, ripe fruit; 3, seed: *of natural size*; 4, sepal; 5, petal with its scale; 6, stamens of a male bud seen from above: *enlarged*; 7, single stamen, front view: *much enlarged*.

TARAKTOGENOS, Hassk. *Nat. Ord. Bixineæ.*

Trees with entire alternate leaves and minute fugaceous stipules. *Flowers* in more or less dense, short, axillary, few-flowered cymes; a few hermaphrodite, but the majority staminiferous only. *Staminiferous flower; sepals* 4, in decussate pairs, much imbricate, rotund, concave: *petals* 8, in two rows, smaller than the sepals, imbricate, each with a gland at its base; glands less than half as large as the petals, fleshy, cuneate, plano-convex, ridged, the apex often irregularly toothed and with 2 or 3 cylindric pits. *Stamens* 20 to 32, the anthers deeply cordate. *Female flowers* like the males, but the sepals often only 3, the petals 6, and the stamens 16 or 17; *ovary* elongate-ovoid, sulcate, divided above into 4 oblong, divergent, reflexed lobes, each bearing a stigmatic surface internally; 1-celled with 4 multi-ovulate parietal placentas. *Fruit* large, globular or ovoid, with hard fibrous or woody rind, and several large seeds embedded in a scanty pulp. *Seeds* with thick hard testa, copious albumen, and straight central embryo; the cotyledons large, cordate, foliaceous, 3-nerved. Species probably about 8; all Malayan.

Note.—This genus was founded by Hasskarl (Retzia, i. 127) on the plant named *Hydnocarpus heterophyllus* by Blume (Rumphia, iv, 22, t. 178B., fig. 1, and Mus. Bot. i, 16). Until now that plant has been the only known species. But the following have been discovered by Messrs. Kunstler and Wray in Perak. And from the similarity in externals to *Hydnocarpus*, as well as from the imperfect nature of the Herbarium materials of the latter, it appears to me extremely probable that several things now referred to *Hydnocarpus* really belong to *Taraktogenos*. In the Calcutta Herbarium, there are imperfect materials of, at least, 8 undescribed species which belong either to one or other of these two genera.

PLATE 152.

TARAKTOGENOS KUNSTLERI, King in Journ. As. Soc. Bengal, for 1890, *pt.* 2, *p.* 122.

A sub-glabrous tree 40 to 60 feet high. Young branches fulvous-puberulous. *Leaves* coriaceous, unequal-sided, oblong-lanceolate to elliptic, shortly acuminate; the base narrowed and unequal, 3-nerved; both surfaces shining, the lower rough from the prominent nerves and reticulations; lateral nerves 3 to 5 pairs on the narrower and 4 to 7 pairs on the wider side, sub-erect, prominent beneath; length 4·5 to 6 in., breadth 1·5 to 3 in.; petiole ·3 to ·5 in., puberulous. *Cymes* dense, many-flowered. *Male flowers* ·5 to ·6 in. in diam.; their pedicels ·25 to ·35 in.; petals densely sericeous externally, the scales half as long, their apices erose, glabrous. *Stamens* 24 to 32; the filaments short, subulate, sericeous; anthers elongate, deeply cordate. *Female flowers* like the males, but sepals 3, petals 6, and stamens about 17 only. *Ovary* ovoid, glabrous, deeply sulcate, with 4 radiating reflexed oblong stigmas, 1-celled, with 4 multi-ovulate parietal placentas. Fruit solitary, globular, smooth, 2·5 in. in diam.; the pericarp thick, the outer layer fibrous, the inner woody. *Seeds* embedded in scanty pulp, plano-convex, ·75 in. or more in length.

Perak; in dense forest at low elevations; King's collector, Nos. 6042 and 8183; Wray, 3389.

PLATE 152. *Taraktogenos Kunstleri*, King. 1, branch with male flowers; 2 ripe fruit: *of natural size;* 3, sepal; 4, petal; 5, staminal column; 6, stamens; 7 rudimentary ovary from male flower: *much enlarged.*

RYPAROSA (RYPARIA), Blume. *Nat. Ord. Bixineæ.*

Trees or shrubs with entire, alternate, elongate, petiolate leaves, finely reticulate and more or less glaucescent beneath. *Flowers* rather small, diœcious; the males in long axillary racemes; the females in shorter racemes, solitary, or in pairs. *Calyx* globose in bud, 3- to 5-cleft. *Petals* 5, imbricate, coriaceous; in the female flower each with a large sericeous scale at its base. *Male flower;* filaments united in a column with 5, ovate, 2-celled, extrorse anthers at its apex. *Female flower; staminodes* 5, alternate with the petals. *Ovary* 1-celled, with 1 to 3, biovulate, parietal placentas. *Stigmas* 2 to 3, sessile, broad, emarginate. *Fruit* baccate with little pulp; the pericarp coriaceous, tomentose. *Seeds* 1 or 2, sub globular, smooth.

Note.—This genus was first published by Blume in his Bijdragen (p. 600) as *Ryparosa*, and in that work he published only the single species *R. cæsia*. In a footnote to the preface of his *Flora Javae* (p. viii), the same author referred to the genus (apparently by inadvertence) as *Ryparia* instead of *Ryparosa;* and the name *Ryparia* has been adopted by most subsequent authors. Blume regarded the genus as *Euphorbiaceous*, in which view he was followed by Endlicher (Gen. 5836), Hasskarl (Pl. Jav. Rar., p. 267), and Baillon (Etud. Euph., p. 339). Müll. Arg. (in DC. Prod. XV, ii., p. 1260) excluded the genus from *Euphorbiaceae*; and, in their *Genera Plantarum*, the late Mr. Bentham and Sir J. D. Hooker, (G. P. iii., 257), also exclude it; but, having seen no specimens either of it or of *Bergsmia*, they make no suggestion as to the true position of *Ryparosa* or of the relation of *Bergsmia* to it. Kurz (Journ. Bot. for 1873, p. 233, and For. Fl. Burm. I. 76) was the first to refer *Ryparosa* to *Bixineae*. But Kurz made the mistake of describing in the latter work, as "*Ryparia cæsia*," a plant which agrees neither with Blume's description nor with his specimens of *Ryparosa cæsia*. The name of Kurz's plant I have therefore altered to *R. Kurzii*. In 1848, Blume published, in Rumphia IV, p. 23, t. 178 C., fig. 2, a new genus called *Bergsmia* which, as Kurz also pointed out (Journ. of Bot. for 1873, p. 233), is nothing more or less than his older *Ryparosa*. Only one species (*B. javanica*) was known to Blume. To this Miquel added (Fl. Ind. Bat. Suppl. 389) two species, namely, *B. Sumatrana* and *B.? acuminata*. I have seen neither of these; but the cymose inflorescence of *B. Sumatrana* leads me to believe that it must be a *Hydnocarpus*, while the second (*B? acuminata*) was referred doubtfully to *Bergsmia* by its author himself. The collections brought, within the past year or two, from Perak by the collectors of the Calcutta garden contain copious suites of specimens of *Ryparosa* and, from an examination of these, I have no doubt that *Ryparosa* belongs to *Bixineae*, and that *Bergsmia* must be reduced to it. Besides the seven species described below, there are in the Calcutta Herbarium imperfect materials belonging to, several additional species from Perak, and to some from Sumatra. Wall. Cat. No. 7847B. (from Penang) and Beccari's No. 702 (from Sumatra), are also clearly species of *Ryparosa*.

PLATE 153.

RYPAROSA CÆSIA, Bl. Bijdr. 600; *Ryparia*, Fl. Javae (praef. VIII).

A small tree, the branchlets and inflorescence ferrugineous-silky. *Leaves* coriaceous, oblong or obovate, shortly acuminate, the base slightly narrowed; upper surface shining; lower pale, rather densely but minutely adpressed-sericeous; nerves 4 or 5 pairs, ascending; length 6 to 9 in.; breadth 2 to 3 in.; petiole ·75 to 1 in., stout, thickened in its upper fourth. *Racemes* solitary, supra-axillary, the female longer than the leaves. *Male flowers*: *sepals* 3, ovate, glabrous; *petals* 5, tomentose, with a basal hairy scale. *Staminal tube* short, glabrous; *anthers* 4, broadly ovate, reflexed. Pistil (in female flower only) with pubescent ovoid globose ovary. *Fruit* crowned by the 2 shortly-stalked fleshy radiating reniform emarginate stigmas, globose, ferruginous-tomentose, ·5 to ·7 in. diam. Hassk. Pl. Javan. Rar. 267: Baillon Euphorb. 339. Miq. Fl. Ind. Bat. i. pt. 2, p. 361. DC. Prod. XV, 2 p. 1260. Kurz in Journ. Bot. 1873, p. 233. King in Journ. As. Soc. Bengal for 1892, pt. II, p. 128.

Java, Blume. Sumatra; Teysmann, Forbes, at an elevation of 3,500 feet.

Blume describes the lower surfaces of the leaves as "tenuiter strigosis"; but the hairs, although adpressed, are not stiff but silky. This is the only species in which the hairs on the lower surface of the leaves are at all conspicuous. The leaves of the Andaman plant referred to *R. caesia* by Kurz are nearly glabrous beneath.

PLATE 153. *Ryparosa caesia*, Blume. 1, branch with inflorescence of male flowers; 2, branch with ripe fruit; 3, section of ripe fruit: *of natural size*; 4, male flower: *enlarged*; 5, sepal; 6, petal; 7, staminal column; 8, pistil (from female flower): *much enlarged*.

PLATE 154.

RYPAROSA KURZII, King in Journ. As. Soc. Bengal, for 1892, *pt.* 2, *p.* 125.

A tree or shrub. Young shoots adpressed ferruginous-puberulous. *Leaves* elliptic to elliptic-oblong, shortly and bluntly acuminate, the base slightly narrowed; upper surface shining, glabrous except the puberulous midrib; lower glaucous, the reticulations distinct; nerves 6 or 7 pairs, spreading, prominent beneath; length 8 to 12 in., breadth 4 to 5·5 in.; petiole 1·25 in., thickened in its upper fourth, pubescent. *Male racemes* 5 to 10 in. long, ferruginous-tomentose, the petals reflexed: *female racemes* shorter and subglabrous. *Fruit* globose, the size of a small cherry, lenticellate, 1—2-seeded. *R. cæsia*, Kurz F. Fl. Burm., i, 78, not of Bl.

Andamans; Kurz, King's Collector. Nicobars, Kurz.

PLATE 154. *Ryparosa Kurzii*, King. 1, branch with male flowers; 2, raceme of ripe fruit; 3 and 4, seeds: *of natural size*; 5, flower dissected; 6, staminal column: *enlarged*.

PLATE 155.

RYPAROSA WRAYI, King in Journ. As. Soc. Bengal, for 1892, *pt.* 2, *p.* 126.

A tree 60 to 80 feet high, glabrous except the young branches and inflorescence. *Leaves* coriaceous, ovate-lanceolate to oblong or elliptic, the apex sub-acute; the base slightly narrowed; upper surface shining; lower dull yellowish green when dry, the midrib and 4 pairs of sub-erect nerves prominent below as are the transverse veins; length 5 to 10 in., breadth 1·75 to 4·5 in.; petiole ·75 to 1·25 in., slightly winged at the apex. *Racemes* solitary or in pairs, axillary or from below the leaves, 6 to 9 in. long, longer in fruit. *Male flowers* pedicelled. *Calyx* with 3 broadly ovate teeth, pubescent externally. *Petals* 5, oblong-ovate, pubescent externally, each with a triangular sericeous scale half as long as itself. *Staminal tube* pubescent; anthers 5, ovate, reflexed. *Female flower; sepals* and *petals* as in the male; disc annular, with 5 conical staminodes. Ovary rugulose, pubescent, globular, 1-celled. Stigmas 2, sub-bifid, spreading. *Fruit* globular, crowned by the stigmas, rugose, pubescent, ·5 to ·75 in. in diam., 1-seeded.

Perak; King's Collector, Wray; rather common.

PLATE 155. *Ryparosa Wrayi,* King. 1, branch with male flowers; 2, branch with ripe fruit: *of natural size;* 3, male flower: *enlarged;* 4, sepal of male flower; 5 petal of the same; 6, staminal column: *much enlarged.*

PLATE 156.

RYPAROSA SCORTECHINII, King, in Journ. As. Soc. Bengal, for 1892, *pt.* 2, *p.* 126.

A slender tree; the branchlets and inflorescence rusty, otherwise glabrous. *Leaves* large, thinly coriaceous, oblong-lanceolate or oblanceolate, shortly and abruptly acuminate, gradually narrowed from the middle to the base; both surfaces glabrous, the upper shining, the lower dull, pale; the midrib and 5 to 7 pairs of nerves very prominent; length 10 to 15 in., breadth 3 to 6 in.; petiole 1·5 to 2·5, thickened and bent at the apex. *Racemes* in tufts from tubercles on the stem and large branches, the male 8 to 12 in. long. *Calyx* splitting into 3 ovate segments, tomentose. *Petals* 4, ovate, acute; the gland large, rotund, sericeous. *Female racemes* shorter; sepals and petals as in the male; ovary tomentose, obscurely 4-angled; stigmas 2, discoid. *Fruit* angled when young: when ripe transversely oblong, the apex retuse, 1·5 in., by 1 in., velvetty rusty-tomentose with green or white dots; seeds two, plano-convex.

Perak: Scortechini, Kunstler, Wray; common.

The male flowers have been found only by Scortechini, from whose field notes the above description of them has been taken.

PLATE 156. *Ryparosa Scortechinii,* King. 1, branch with advanced female flowers; 2, raceme of young female flowers; 3, raceme with young fruits; 4, ripe seeds: *of natural size*; 5, petal from female flower; 6, sepal from the same; 7, pistil: *enlarged.*

PLATE 157.

RYPAROSA KUNSTLERI, King in Journ. As. Soc. Bengal, for 1892, *pt.* 2, *p.* 127.

A tree 50 to 60 feet high, the branchlets minutely rusty puberulous. *Leaves* coriaceous, ovate-oblong, obovate-oblong to oblong, shortly and abruptly acuminate, the base narrowed; upper surface shining; lower dull, pale, much reticulate, the midrib and 5 to 7 pairs of nerves very prominent; length 5 to 8 in., breadth 2 to 3 in.; petiole 1 to 1·5 in., swollen and bent towards the apex. *Racemes* axillary, solitary, rarely 2 or 3 from an axil, the male 6 to 8 in. long, the female half as long, flowers pedicelled. *Male flower; calyx* thin, pubescent outside, with 3 ovate broad teeth. *Petals* 5, oblong-lanceolate, pubescent externally, each with a large sericeous gland at its base; *staminal tube* glabrous, the anthers ovate-oblong. *Female flower*; *sepals* and *petals* as in the male, annular disc at base of ovary small, staminodes none; *ovary* ovoid, angled, tomentose, 1-celled, with 4 parietal bi-ovulate placentas; stigmas obovate, radiating. *Fruit* globular, yellowish, velvetty, about 1·5 in. diam.; *seeds* 5 or 6, oblong, compressed, striate, about ·75 in. long.

Perak, at elevations up to 800 feet, common.

A tree 40 to 100 feet in height, with shorter and in proportion) broader leaves than *R. fasciculata*, 4 stigmas, and more globular pedicellate fruit.

PLATE 157. *Ryparosa Kunstleri*, King. 1, branch with female flowers and young fruit; 2, ripe fruit (of small size); 3, section of the same: *of natural size*; 4, male flower; 5, female flower: *enlarged*; 6, sepal of male flower; 7, petal of the same; 8, staminal column; 9, pistil: *much enlarged*.

PLATE 158.

RYPAROSA FASCICULATA, King in Journ. As. Soc. Bengal, for 1892, *pt.* 2, *p.* 127.

A glabrous tree 30 to 60 feet high. Young branches lenticellate. *Leaves* thinly coriaceous, narrowly oblong, acuminate, the base narrowed, shining above, pale beneath; midrib, 5 to 7 pairs of lateral nerves, and the bold sub-horizontal transverse nerves and reticulations very distinct especially beneath; length 9 to 15 in., breadth 2·25 to 3·75 in.; petiole 1 to 1·5 in., grooved, thickened in its upper fourth. *Racemes* in fascicles of 4 to 7 from tubercles on the large branches and stem. *Calyx* with 3 broadly ovate teeth. *Petals* rotund, much imbricate and inflexed. *Female* flower with annular disc bearing 5 conical staminodes, the petals with hairy scales at their bases; stigmas 3, large, sub-reniform. *Fruit* rusty-tomentose, pyriform, the apex mamillate and crowned for some time by the remains of the stigmas, about 6-seeded, 1·5 to 2 in. long.

Perak, at elevations up to 800 feet; common.

PLATE 158. *Ryparosa fasciculata*, King. 1, leaf-twig; 2, fascicles of male flowers from a stem-tubercle; 3, fascicles of female flowers; 4, ripe fruits; 5, section of ripe fruit: *of natural size*; 6, male flower (from below); 7, male flower from above; 8, petal; 9, staminal column; 10, female flower from the side: *enlarged*.

PLATE 159.

TRIGONIASTRUM HYPOLEUCUM, Miq. Fl. Ind. Bat. Suppl. I, 395.

Nat. Ord. Polygaleæ.

A slender tree, 30 to 60 feet high; young branches hoary-pubescent; the older with dark brown, lenticellate bark. *Leaves* elliptic-lanceolate, shortly and bluntly acuminate, narrowed to the base; both surfaces shining; the upper glabrous; the lower pale, very minutely scurfy-pubescent, the reticulations and 6 pairs of nerves bold and prominent; length 4 to 5 in., breadth 1·25 to 1·75 in.; petiole ·2 to ·3 in. *Panicles* axillary and terminal, slender, spreading. *Flowers* ·25 in. in diam., shortly pedicellate. *Sepals* 5, pubescent, slightly unequal. *Ovary* hairy. *Samaras* 2 in. long; the nucleus 1 in. to 1·25 long, triangular, flat; the wing thinly membranous, pale yellow, oblong, its apex blunt, oblique, venation vertical, the areolae wide. King in Journ. As. Soc. Bengal, for 1889, Pt. 2, p. 133. *Isopteris penangiana,* Wall. Cat. 7261.

Penang. Malacca. Perak; common.

The pubescence on the under surfaces of the leaves is so minute that, without a good lens, it is not seen.

PLATE 159. *Trigoniastrum hypoleucum,* Miq. 1, flowering branch; 2, fruiting branch: *of natural size;* 3, flower showing the five petals and two of the sepals: *enlarged;* 4, sepal; 5, lateral petal; 6, the large saccate odd petal; 7, pistil and stamens: *much enlarged.*

XANTHOPHYLLUM, Roxb. *Nat. Ord. Polygaleæ.*

Trees or shrubs. *Leaves* coriaceous or sub-coriaceous, usually drying yellowish-green. *Sepals* 5, nearly equal. *Petals* 5 or 4, the inferior keeled, not crested. *Stamens* 8, distinct, variously attached to the base of the petals, or hypogynous. *Ovary* stipitate, 1-celled, often surrounded by a hypogynous disc.; style more or less filiform, ovules various in insertion and number. *Fruit* 1-celled, 1-seeded, indehiscent. *Seeds* exalbuminous, estrophiolate.

PLATE 160.

XANTHOPHYLLUM ANDAMANICUM, King in Journ. As. Soc. Bengal, for 1890, *pt.*, 2, *p.* 135.

A tree 20 to 30 feet high, glabrous except the inflorescence, branches dark brown. *Leaves* thinly coriaceous, drying a pale greenish passing into brown, elliptic to elliptic-oblong, rarely sub obovate, sub-acute, the base cuneate; upper surface smooth, shining, the lower dull and pale, both minutely reticulate; main nerves 7 to 8 pairs, slightly prominent; length 3 to 4 in., breadth 1·25 to 1·75 in.; petiole ·3 to ·4 in. *Flowers* ·3 in. long, their pedicels about as long. *Panicles* extra-axillary or terminal, 1·5 to 3 in. long, lax, few-branched, slender. *Sepals* ovate to rotund, pubescent, edges ciliolate. *Petals* broadly ovate, glabrous, keel pubescent. *Filaments* flat and pubescent at the base, otherwise cylindric and glabrous. *Ovary* elongate-ovoid, glabrous, 4-ovuled, tapering into the rather flat, pubescent style; disc corrugated, glabrous. *Fruit* globose, ·5 in. in diam., smooth; pericarp thin, crustaceous.

Andaman Islands; Helfer, Kurz, King's Collector. Burma, Kurz.

This is not unlike *X. Griffithii* in its leaves; but it differs in its glabrous ovary and fruit.

PLATE 160. *Xanthophyllum Andamanicum,* King. 1, flowering branch; 2, ripe fruit: *of natural size;* 3, flower dissected; 4, stamens; 5, pistil: *much enlarged.*

PLATE 161.

XANTHOPHYLLUM WRAYI, King in Journ. As. Soc. Bengal, for 1890, *pt.* 2, *p.* 138.

A shrub 3 to 8 feet high, the young branches minutely tomentose. *Leaves* sub-coriaceous, drying a pale yellowish-green, elliptic to oblong, more or less acuminate, the base rounded or narrowed; upper surface shining; lower slightly dull, pale and rather minutely reticulate; the main nerves 8 to 13 pairs, prominent, forming arches ·2 in. within the edge; length 6 to 12 in., breadth 2·25 to 4·5 in., petiole ·3 to ·6 in. *Flowers* ·35 in. long, their pedicels shorter than the calyx, in terminal or axillary racemes or small panicles less than a third of the length of the leaves. *Sepals* broadly ovate, blunt, puberulous. *Petals* with an oblong or rotund concave obtuse limb, puberulous in the upper, pubescent in the lower half, and with a long claw. *Filaments* epipetalous, flat, pubescent. *Ovary* on a glabrous stalk, densely villous, 4-ovuled, the disc glabrous. *Fruit* globose, ·75 to 1 in. in diam.; when young sericeous, when ripe quite glabrous and boldly verrucose.

Penang, Curtis; No. 677. Perak, King's Collector Wray.

This is not unlike *X affine*, Korth., but is distinguished from that species by its sericeous ovary and deeply warted fruit. In its fruit this resembles *X. Palembanicum* and *P. eurynchum;* but it differs from both in its much larger and more numerously veined leaves.

PLATE 161. *Xanthophyllum Wrayi*, King. 1, flowering branch; 2, ripe fruit; 3, seeds: *of natural size*; 4, flower: *enlarged*; 5, sepal; 6, odd petal with two stamens attached; 7, petal with two stamens attached; 8, petal with single stamen attached; 9, pistil and disc: *much enlarged*; 10, stamens: *very much enlarged*.

PLATE 162.

XANTHOPHYLLUM KUNSTLERI, King in Journ. As. Soc. Bengal, for 1890, *pt.* 2, *p.* 139.

A glabrous tree 50 to 80 feet high; the branchlets robust, dark brown, sub-glaucous. *Leaves* large, coriaceous (with a yellowish green tinge when dry) elliptic to elliptic-oblong, the apex very shortly and rather suddenly acuminate, the edges (when dry) undulate, the base rounded or slightly narrowed to the stout petiole; both surfaces shining; main nerves sub-horizontal, 8 to 12 pairs, prominent beneath as are the secondary nerves and reticulations; length 4·5 to 11 in., breadth 2·25 to 5·25 in., petiole ·6 to ·75 *Flowers* ·6 in. long, shortly pedicellate, in axillary racemes less than half as long as, or in terminal few-branched spreading panicles, longer than the leaves. *Sepals* slightly unequal, ovate-rotund, fleshy, thickened along the midrib, minutely tomentose on both surfaces; the edges thin, ciliolate. *Petals* oblong-obtuse, glabrous except the pubescent sagittate concave keel. *Filaments* with a pubescent ovoid swelling above the base, attached to the base of the petals. *Anthers* bearded at the base. *Ovary* almost sessile, surrounded by a shallow wavy fleshy disc, ovoid, grooved, tomentose, 4-ovulate; style conical, slightly curved, pubescent. *Fruit* globose, ·65 in. in diam. (young), deciduously tomentose; pericarp thick, spongy, the calyx persistent.

Perak, at low elevations, not common. Penang, Government Hill, King's Collector. Curtis, No. 1590.

The stamens of this are united to the base of the petals in an unequal way, three being attached to the odd petal, one to two of the lateral petals, while two petals have no stamens attached to them.

PLATE 162. *Xanthophyllum Kunstleri*, King. 1, flowering branch; 2, large leaf; 3, young fruit; 4, seed: *of natural size;* 5, flower: *enlarged;* 6, odd petal, front view; 7, the same, side view, the 3 stamens being removed from both; 8, lateral petal with one stamen attached: *enlarged;* 9, two stamens; 10, pistil and ovary: *much enlarged.*

PLATE 163.

XANTHOPHYLLUM SCORTECHINII, King in Journ. As. Soc. Bengal, for 1890, *pt.* 2, *p.* 140.

A glabrous tree 25 to 30 feet high. *Leaves* thinly coriaceous, drying brown, ovate, obtusely acuminate, the base more or less cuneate, shining on both surfaces; nerves 3 pairs, sub-erect, not prominent; length 2 to 2·25 in., breadth 1 to 1·35 in., petiole ·35 in. *Flowers* handsome, ·75 in. long, their pedicels ·35 in. *Racemes* axillary, solitary 1 to 1·5 in. long, few-flowered. *Sepals* fleshy, glabrous with ciliolate edges; the three outer ovate blunt, the two inner rotund. *Petals* obovate to elliptic, clawed, glabrescent, the keel puberulous. *Filaments* as long as the petals, flat; anthers short, ovate. *Ovary* shortly stalked, elongated-ovoid, glabrous, 6-ovuled; style little curved, glabrous; stigma capitate; disc small, annular, glabrous. Ripe fruit, globular, sub-glabrous, about 2 in. in diam.; pericarp thick, hard.

Perak. Scortechinii, No. 2079; Wray No. 4028. Penang, Curtis, No. 2407.

PLATE 163. *Xanthophyllum Scortechinii,* King. 1, flowering branch; 2, fruit: *of natural size;* 3, flower, its parts separated; 4, anthers with upper part of filament; 5, ovary style and stigma: *enlarged.*

PLATE 164.

XANTHOPHYLLUM PULCHRUM, King in Journ. As. Soc. Bengal, for 1890, *pt.* 2, *p.* 141.

A glabrous shrub or small tree, the young branches rather robust, the bark very pale. *Leaves* coriaceous, shortly petiolate, elliptic, acute or very shortly and bluntly acuminate, the edges recurved when dry, base rounded or minutely cordate; upper surface shining; lower dull, pale yellow, glaucous, the 5-6 pairs of nerves and the fine reticulations prominent; length 4 to 8 in., breadth 2·25 to 3·5 in.; petiole stout, ·2 in. *Flowers* ·6 in. long, on short thick pedicels, in dense, solitary, axillary, rufous-tomentose racemes half as long as the leaves or less; bracts broadly ovate, concave, deciduous, coloured. *Sepals* nearly equal, ovate-rotund, fleshy, concave, sub-glabrous or puberulous, coloured, the edges thin. *Petals* oblong, blunt, glabrous except the pubescent keel. *Filaments* broad, flat, puberulous, all except one or two inserted in the disc: anthers bearded at the base. *Ovary* ovoid, pointed, tomentose, surrounded by a thin, rather deep, glabrous disc; style glabrescent, slightly curved; ovules 12. *Fruit* globose, ·75 in. in diam., minutely tomentose when ripe, pericarp thin

Perak: rather common. A handsome bush or treelet with yellowish flowers tinged with pink.

PLATE 164. *Xanthophyllum pulchrum,* King. 1, flowering branch; 2, ripe fruit; 3 seeds: *of natural size;* 4, sepal; 5, keel; 6, petal; 7, petals with one stamen attached; 8, seven stamens attached to the disc: *enlarged;* 9, stamen: *much enlarged.*

PLATE 165.

CRATOXYLON MAINGAYI, Dyer in Hook. fil. Fl. Br. Ind. I, 258.

Nat. Ord. Hypericineæ.

A tree 30 feet high, all parts glabrous; young branches with pale brown, ridged bark. *Leaves* thinly coriaceous, elliptic, acute at apex and base; both surfaces shining, the lower paler; main nerves obscure, about 6 pairs; length 2 to 3·5 in., breadth 1 to

1·5 in., petiole ·25 in. *Cymes* axillary, or from above the scars of fallen leaves, few-flowered. *Flowers* ·5 to ·7 in. long, their pedicels ·25 in. *Sepals* oblong, slightly unequal. *Petals* obovate-elliptic, obtuse, clawed, veined, the basal scale acute, stamens in three phalanges. *Styles* 3, longer than the stamens, united below, stigmas capitate. *Capsule* ·5 in. long, narrowly cylindric. *Seeds* ·25 in. long, with oblong unilateral wing. King in Journ. As. Soc. Bengal, for 1890, pt. 2, p. 145.

Penang; Maingay.

Apparently an uncommon tree, since only Maingay has as yet collected it.

PLATE 165. *Cratoxylon Maingayi*, Dyer. 1, flowering, and 2, fruiting branch: *of natural size*; 3, flower dissected: *enlarged*; 4 and 5, phalanges of stamens; 6, anthers; 7, pistils: *much enlarged.*

GARCINIA, Linn.

Nat. Ord. Guttiferæ.

Trees, usually with yellow juice. *Leaves* evergreen, coriaceous, very rarely stipulate. *Flowers* solitary, fascicled, or panicled, axillary or terminal, polygamous. *Sepals* 4-5, decussate. *Petals* 4-5, imbricate. MALE FL.; *Stamens* ∞, free, or collected into a ring, or an entire globose or conical 4-5-lobed mass, often surrounding a rudimentary ovary; anthers sessile, or on short thick filaments, 2-rarely 4-celled, adnate or peltate, dehiscing by slits or pores, or circumscissile. FEMALE OR HERMAPHRODITE FL.; *Staminodes* 8-∞, free or connate. *Ovary* 2-12-celled; stigma sessile or sub-sessile, peltate, entire or lobed, smooth or tubercled; ovules solitary in each cell, attached to the inner angle of the cell. *Berry* with a coriaceous rind. *Seeds* with a pulpy aril.

PLATE 166.

GARCINIA OPACA, King in Journ. As. Soc. Bengal, for 1890, *pt.* 2 p. 160.

A tree 40 to 60 feet high; the branchlets (when dry) dull dirty yellow, striate. *Leaves* oblong, narrowed at each end, the apex more or less acuminate, the base cuneate; upper surface slightly shining, lower surface opaque, whitish; the rather numerous nearly horizontal nerves thin, little visible on either surface, the midrib bold and prominent on both; length 4 to 5 in., breadth 1·75 to 2·25 in., petiole ·6 in. *Male flowers* ·75 in. in diam., in shortly pedicelled, 2- to 3-flowered, ebracteolate, terminal or axillary cymes; pedicels ·25 in., annulated; *sepals* 4, ovate, concave, thin, veined; *petals* 4, similar to the sepals, but a little larger; *stamens* numerous, on a single, convex, fleshy receptacle; *anthers* sessile, depressed-globular, with circumscissile dehiscence; rudimentary *stigma* 0. *Female flowers* solitary, terminal: *sepals* more coriaceous than those of the male flower; staminodes 0; *ovary* cylindric; stigma convex, smooth, the edge irregularly subcrenate. *Fruit* solitary, terminal, ovate-globose, slightly mammillate, crowned by the broad flat stigma which has 4 broad shallow rounded lobes; the sepals rounded, cartilaginous, persistent; pericarp brown when dry, thin, crustaceous. Seeds several, ovoid, flattened on one side. *G. cornea*, Wall. Cat. 4852 E.

Perak; King's Collector, Scortechini.

Distinguished by its leaves opaque and whitish beneath and with faint sub-horizontal nerves. In fruit this resembles *G. Penangiana;* but it has a very different stigma.

PLATE 166. *Garcinia opaca*, King. 1, branch with male flowers; 2, female flower; 3, ripe fruit: *of natural size;* 4, male flower dissected; 5, single stamen: *enlarged.*

PLATE 167.

GARCINIA KUNSTLERI, King in Journ. As. Soc. Bengal, for 1890, *pt.* 2, p 165.

A shrub, 6 to 8 (rarely 15) feet high; the young branches dark-coloured, not-angled. *Leaves* membranous, oblanceolate to narrowly ovate-lanceolate, shortly but sharply acuminate, the base much narrowed; smooth on both surfaces, the lower rather pale; nerves indistinct, spreading, 9 to 13 pairs, some of the intermediate almost as distinct as the primary; length 3·5 to 5 in., breadth 1·15 to 1·8 in., petiole ·35 to ·6 in. *Male flowers* about ·15 in. in diam., in small axillary or terminal fascicles of 3 to 6. *Sepals* 4, ovate-orbicular, membranous, concave. *Petals* 4, broadly ovate, blunt, fleshy, concave. *Stamens* about 15, forming a convex mass; the anthers transversely flattened, 4-celled, the connective broad; rudimentary pistil 0. *Female flowers* solitary; *sepals* 4, orbicular, membranous, veined. *Petals* 0. Staminodes 4, with filaments half as long as the ovary, and flat square heads. *Ovary* thick, cylindric, vertically grooved; the stigma convex, with large prominent black-tipped conical papillæ, and with about 10 inconspicuous lobes. *Fruit* orange-yellow, depressed, sub-globose, about 1·25 in. in diam., smooth, the sepals persistent at its base for some time.

Perak, at low elevations, common: King's Collector, Scortechini, Wray.

This is allied to the Burmese *G. linoceiroides*, T. Anders.; but has smaller flowers, fewer stamens and more acuminate leaves.

PLATE 167. *Garcinia Kunstleri*, King. 1, twig with male flowers; 2, ripe fruit: *of natural size;* 3, male flower; 4, two petals; 5, two sepals; 6, staminal column: *enlarged.*

PLATE 168.

GARCINIA WRAYI, King in Journ. As. Soc. Bengal, for 1890, *pt.* 2, *p.* 152.

A small spreading tree; young branches very slender, dirty yellow. *Leaves* thinly coriaceous, ovate or elliptic, the apex produced into a long sub-spathulate point, the base cuneate; upper surface shining, the lower dull, pale; nerves slender, sub-horizontal, ·05 in. apart, invisible on the upper and faint on the lower surface even when dry; length 2 to 2·5 in., of which the apical tail is sometimes as much as ·75 in., breadth ·8 to 1·2 in.; petiole ·2 in. *Male flowers* ·25 in. in diam., in pedunculate axillary fascicles of 2 or 3; buds globose, pedicels ·15 in.; perianth reflexed; *sepals* 4, the outer less than half as large as the inner pair, all orbicular, sub-coriaceous and concave; *petals* 4, orbicular, blunt, with a thickened spot near the base, covering the stamens in bud: *stamens* numerous, on both surfaces of 4 fleshy processes; anthers sessile, globular-oblong, the connective rather thick, 2-celled, dehiscence vertical; rudy. style cylindric; stigma sub-lobulate, convex. *Female flowers* axillary, solitary, or clustered like the males; *sepals* 4, orbicular, thin, concave, about the same size as the petals and neither sepals nor petals quite covering the stigma in bud: *petals* 4, orbicular, concave, with a coloured thickened spot near the base, staminodes none; *ovary* cylindric; *stigma* hemispheric, smooth, entire, enveloping the upper part of the ovary, ultimately becoming discoid and slightly depressed in the middle. Young fruit cylindric, crowned by the stigma which has become flattened.

Perak; on Ulu Batang Padang and on Gunong Batu Pateh, at elevations of 4,500 feet and upwards. Wray, Nos. 267, 362, 1527; Scortechini, No. 323*b*.

I have not seen ripe fruit of this, but (judging from the appearance of a young one) it is probably ovoid. In its leaves, this species rather resembles *G. merguensis* and *G. rostrata*.

Plate 168. *Garcinia Wrayi*, King. 1, branch with male flowers; 2, branch with very young fruit: *of natural size;* 3, male flower with the petals and rudimentary stigma removed; 4, petal of male flower; 5 & 6, two groups of stamens; 7, front of a stamen; 8, back of same; 9, rudimentary stigma of male flower; 10 & 11, petals of female flower; 12, stigma and ovary of female flower: *enlarged.*

PLATE 169.

Garcinia Andamanica, King in Journ. As. Soc. Bengal, for 1890, *pt.* 2, *p.* 170.

A tree from 20 to 40 feet high; young branches 4-angled, pubescent. *Leaves* elongate-ovate, often inequilateral, sub-acute; the base broad, rounded or slightly cordate; both surfaces glabrous, shining; main nerves 14 to 16 pairs, rather prominent; length 8 to 11 in., breadth 4 to 5·5; petiole ·5 in., stout. *Male flowers* about ·3 in. in diam., in short dense axillary fascicles from short wart-like branches below the leaves. *Sepals* 5, sub-coriaceous, ovate-rotund, imbricate, pubescent externally. *Petals* 5, larger than the sepals, thin, rotund, clawed, imbricate, puberulous. *Stamens* indefinite, in 5 thick fleshy bundles; anthers minute, sub-globular, introrse. *Disk* of 5 broad corrugated glands much shorter than the bundles of stamens and alternating with them. *Pistil* 0. *Female flower* unknown. *Fruit* sub-globular or obliquely ovoid, smooth, bright yellow, 1 to 1·5 in. long and ·75 to 1·25 in. in diam., shortly apiculate, tapering to the base; the 5-lobed stigma persistent for some time. *G. dulcis*, Kurz (not of Roxb.), For. Flora Burma i, 92; Pierre Fl. Forest Cochin-Chine, fasc. vi, p. vi, *in part.*

Andaman Islands; Helfer No. 872, Kurz, King's Collector, No. 224.

This species was considered by Kurz to be identical with *Xanthochymus dulcis*, Roxb., a native of the Moluccas cultivated in the Botanic Garden, Calcutta. It does not, however, agree with specimens still in cultivation there, nor with Roxburgh's description. Pierre (l. c.) expresses his doubt as to the indentity of the Andaman and Molucca plants: but he adopts Kurz's name for the latter. This species is closely allied to *G. Villersiana*, Pierre, a common Cambodian plant. The leaves of the latter, as shown in Pierre's figure (Fl. Forest. Cochin-Chine, t. 21) have, however, more nerves; the flowers have longer pedicels, and the staminal bundles are longer and more slender than in this species; the lobes of the disk are also narrower and longer.

This is the Helferian plant referred to under *G. Xanthochymus* in Fl. Br. Ind. i, 269, as allied to, but differing from, that species. There is a variety of this with the leaves shortly pubescent beneath.

Plate 169. *Garcinia Andamanica*, King. 1, branch with male flowers; 2, nearly ripe fruit; 3, section of the same; 4, seeds: *of natural size;* 5, male flower opened up; 6, sepal; 7, petal; 8, the five fascicles of stamens, glands and rudimentary ovary: *enlarged;* 9, a fascicle of stamens with two of the glands of the disc at its base; 10, rudimentary ovary: *much enlarged.*

CALOPHYLLUM, Linn. *Nat. Ord. Guttiferae.*

Trees. *Leaves* opposite, shining, coriaceous, with innumerable parallel slender veins at right angles to the midrib. *Flowers* polygamous, in numerous axillary or terminal panicles. *Sepals* and *petals* 4-12, imbricate in 2-3 series. *Stamens* very many, filaments filiform, often flexuous, free or connate below; anthers erect, 2-celled, dehiscence vertical. *Ovary* 1-celled, style slender, stigma peltate; ovule solitary, erect. *Drupe* with a crustaceous putamen. *Seed* erect, ovoid or globose; testa thin, or thick and spongy.

PLATE 170.

CALOPHYLLUM PRAINIANUM, King in Journ. As. Soc. Bengal, for 1890, *pt.* 2, *p.* 175.

A glabrous tree 40 to 60 feet high; the youngest branchlets polished, terete, yellowish. *Leaves* thinly coriaceous, elliptic-oblong, shortly sub-abruptly and obtusely acuminate, narrowed in the lower third to the short petiole; the nerves rather distinct on both surfaces; lower surface paler than upper, both shining; the edge pale yellow, very slightly thickened: length 2·5 to 4 in., breadth 1 to 1·5 in., petiole 2·5 to 4 in. *Racemes* solitary, axillary, rarely supra-axillary, about 1·5 in. long, ebracteate, lax, few-flowered. *Flowers* ·25 in. in diam.; pedicels slender, ·25 in., the upper rather longer. *Sepals* 4; the outer pair orbicular, concave, puberulous externally; the inner pair larger, imbricate, orbicular-oblong, glabrous. *Petals* 0. *Ovary* ovoid, stigma very broad. *Fruit* sub-spherical, ·4 in. in diam., pericarp thin.

Perak; King's Collector, Nos. 5366 and 7243.

Very like *C. pulcherimum*, but with globular fruit: also like *C. Teysmannii*, but the nervation of the leaves in that species is unusually oblique for the genus, whereas in this the nerves are almost horizontal.

PLATE 170 *Calophyllum Prainianum*, King. 1, flowering branch; 2, fruiting branch: *of natural size*; 3 and 4, outer sepals; 5 and 6, inner sepals; 7, andro-gynoecium: *enlarged;* 8 and 9, stamens; 10, pistil; 11, the same showing vertical section of ovary: *much enlarged.*

PLATE 171.

CALOPHYLLUM SUBSESSILE, King n. sp.

A glabrous tree 60 to 80 feet high; the young branches 4-angled, shining. *Leaves* coriaceous, elliptic-oblong, entire, the apex obtuse or emarginate, the base minutely cordate, both surfaces shining, the edge slightly revolute when dry; length 3·5 to 6 in., breadth 1·75 to 2·5 in., petiole only about ·1 in. long. *Racemes* solitary, few-flowered; bracts small, ovate, deciduous, distichous. *Flowers* ·5 in. in diam., greenish-white; pedicels slender, longer than the flowers. *Sepals* rotund, concave, the *petals* similar but more membranous. *Ovary* globose, striate, about as long as the cylindric style. *Fruit* globular, minutely pubescent, 1 in. or more in diam.

Perak: King's Collector Nos. 6877, 7311.

PLATE 171. *Calophyllum subsessile*, King. 1, flowering branch; 2, ripe fruit: *of natural size*; 3, andro-gynœcium; 4, sepal; 5, petal: *slightly enlarged*; 6, ovary and style; 7, anthers: *much enlarged.*

PLATE 172.

KAYEA, Wall. *Nat. Ord. Guttiferæ.*

Trees. *Leaves* opposite, sub-coriaceous. *Flowers* hermaphrodite, either large and solitary, or small and paniculate. *Sepals* and *petals* 4 each, imbricate. *Stamens* numerous; filaments slender, free or connate at the base ; anthers small, sub-globose, 2-celled, with vertical dehiscence. *Ovary* 1-celled; style slender, stigma acutely 4-fid ; ovules 4, erect. *Fruit* subdrupaceous, fleshy, indehiscent, 1-4-seeded. *Seeds* thick, testa thin and crustaceous.

KAYEA GRANDIS, King in Journ. As. Soc. Bengal, for 1890, *pt.* 2, *p.* 182.

A glabrous tree, 40 to 80 feet high. *Leaves* large, thinly coriaceous, oblong to elliptic-oblong, sub-acute, the edges revolute (when dry), slightly narrowed towards the rounded or sub-acute base ; both surfaces rather dull (when dry), the 20 to 30 pairs of main nerves sub-horizontal, prominent, the secondary nerves also prominent ; length 9 to 18 in., breadth 3 to 4·5 in. ; petiole ·4 to ·75 in., smooth. *Flowers* globose in bud, pedicelled, in short few-flowered axillary cymes crowded in the axils of the leaves, rarely solitary, about 1 in. in diam. when expanded ; pedicels about ·5 in. *Sepals* unequal, rotund, the outer concave, very coriaceous ; the inner thin, not larger than the outer. *Petals* elliptic-oblong, acute, larger than the sepals (·5 in. long or more). *Ripe fruit* turbinate, 2 to 2·5 in. in diam. and 1·25 in. long, the epicarp leathery, completely enveloped by the persistent, thickened, outer sepals.

Malacca ; Maingay (Kew Distrib. 178), Cantlay No. 2354. Perak, King's Collector, Nos. 3897, 7294, 7340.

A very fine species ; at once distinguished by its large leaves and depressed turbinate fruit. The fruit, and probably the whole plant, abounds in yellow juice. According to M. Cantley the wood sinks in water.

PLATE 172. *Kayea grandis*, King. 1, flowering branch ; 2, ripe fruit ; 3, section of ripe fruit : *of natural size ;* 4, outer sepal ; 5, inner sepal ; 6 and 7, petals ; 8, stamens ; 9, pistils : *slightly enlarged ;* 10A, stamen : *much enlarged.*

PLATE 173.

KAYEA KUNSTLERI, King in Journ. As. Soc. Bengal, for 1890, *pt.* 2, *p.* 182.

A glabrous tree 30 to 50 feet high; the branchlets brownish, striate, not tuberculate. *Leaves* thinly coriaceous, elliptic-lanceolate, acuminate, sub-undulate, the base much narrowed to the petiole ; both surfaces rather dull (when dry) with a few scattered opaque black dots ; the lower pale, sub-glaucescent (when dry) ; length 4 to 6 in., breadth 1 to 2·25 in. ; petiole ·25 in. to ·4 in., rugose ; nerves 12 to 20 pairs, unequal, slightly prominent ; the lower horizontal, the upper slightly curving upwards. *Flower* solitary or in clusters of 3 or 4, axillary or terminal, ·75 to 1·5 in. diam., on a very short smooth pedicel, bracts at its base linear-subulate; bud globose, smooth. *Sepals* unequal as in *K. nervosa*. *Petals* oblong-acuminate, ·75 to 1 in. long. Ripe fruit ovoid, gradually narrowing into a short subulate apical beak, 1 to 1·25 in. long.

Perak : King's Collector, Nos. 3301, 6850. Penang, Curtis, No. 1419. Malacca, Maingay, No. 176.

This is allied to *K. nervosa*, T. Anders.; but it is readily distinguished from that by its smooth branchlets, by the leaves much and gradually narrowed to both base and apex, and by the oblong-acuminate petals. A shrubby form of this occurs in Penang (Curtis, Nos. 805, 1418), and in Perak (King's Collector, No. 1345), in which all the parts are smaller and the leaves are less acuminate at the apex, and rounded instead of much attenuated at the base.

PLATE 173. *Kayea Kunstleri*, King. 1, flowering branch; 2, pistil; 3, fruit (immature): *of natural size;* 4, flower, its parts separated: *enlarged;* 5, stamens, *much enlarged.*

PLATE 174A.

KAYEA MANII, King n. sp.

A glabrous tree. Young branches slender, polished, the bark pale brown (when dry). *Leaves* coriaceous, narrowly oblong, tapering to each end, the apex acuminate, the base acute; main nerves about 15 pairs, slightly prominent on the lower surface when dry, curving, both surfaces shining; length 5 to 7 in., breadth about 1·4 in., petiole ·3 in. *Racemes* several from an axil, umbellate, 1·5 to 2·5 in. long, slender, bracts (if any) deciduous. *Flowers* nearly ·5 in. in diam., on slender pedicels ·4 to ·6 in. long. *Sepals* ovate-orbicular, concave. *Petals* broadly ovate, concave, slightly smaller than the sepals. *Stamens* much longer than the petals, very numerous; *anthers* broadly ovate. Pistil longer than the stamens. *Ovary* conical, sub-compressed, boldly ridged, glabrous, tapering into the cylindric style. *Stigma* with three linear lobes. *Unripe fruit* compressed; the style persistent, enveloped in the accrescent sepals. *Mesua Singaporeana*, Wall. Cat. No. 4836.

Singapore: Wallich, Andaman Islands. Mr. E. H. Man.

The Andamans' specimens agree perfectly with Wallich's No. 4836, which had been erroneously referred to *Kayea racemosa*, Planch. by the late Dr. T. Anderson in Hooker's Flora of British India,—a reduction, however, not sanctioned by the authors of that species. This species is a perfectly distinct one; and I dedicate it to Mr. E. H. Man, C.I.E., of the Andamans Commission, a gentleman who has given much willing help in the exploration of the dense forests of these magnificent islands.

PLATE 174A. *Kayea Manii*, King. 1, flowering branch; 2, young fruit: *of natural size;* 3, sepal; 4, petal; 5, andro-gynœcium, opened out; 6, stamens; 7, pistil with vertical section of ovary: *enlarged.*

PLATE 174B.

KAYEA CURTISII, King n. sp.

A tree, all parts glabrous; the young branches thin, polished, dark-coloured when dry. *Leaves* thickly coriaceous, narrowly elliptic-oblong, tapering to each end, the apex acute or acuminate, the base acute; main nerves 15 to 17 pairs, spreading, rather prominent beneath when dry; both surfaces smooth, the lower shining and paler; length 2·5 to 3·5 in., breadth ·75 to 1 in., petioles ·2 to ·3 in. *Flowers* solitary, leaf-opposed, ·75 in. in diam., on pedicels ·2 in. long. *Sepals* broadly ovate-elliptic. *Petals* slightly smaller than the sepals, obovate elliptic, shortly acuminate. *Stamens* numerous, longer than the corolla; anthers reniform with broad central connective. *Pistil* longer than the stamens the ovary ovoid-conic, tapering into the curved cylindric style.

Stigma with 4 linear teeth. *Unripe fruit* ovoid, apiculate, half-enveloped by the accrescent sepals.

Penang: Curtis; Nos. 748 and 805.

PLATE 174B. *Kayea Curtisii*, King. 1, flowering twig; 2, twig with young fruit: *of natural size;* 3, flower; 4, sepal; 5 and 6, petals; 7, stamens; 8, pistil; 9, section of ovary: *enlarged.*

PLATE 175.

TERNSTRŒMIA SCORTECHINII, King in Journ. As. Soc. Bengal, for 1890, *pt.* 2, *p.* 193.

Nat. Ord. Ternstrœmiaceœ.

A tree, 20 to 40 feet high; young branches with pale brownish-grey bark, striate when dry. *Leaves* coriaceous, verticellate, drying of a pale green, oblanceolate, the apex shortly abruptly and rather bluntly acuminate, narrowed from above the middle to the rather stout short petiole, edges entire, under surface rather pale; midrib distinct on both surfaces, nerves visible on neither; length 3 to 5 in., breadth 1·25 to nearly 2 in.; petiole ·4 to ·5. *Flowers* dioecious, ·6 to ·8 in. in diam., pedunculate, axillary, solitary or in fascicles of 2 to 6; peduncles slender, compressed, 1 to 1·5 in. long; the 2 bracteoles about ·2 in. below the calyx, minute, fugacious. *Sepals* subequal, fleshy with thin edges, rotund. *Petals* much larger than the sepals, orbicular to reniform, clawed. *Stamens* in the male very numerous; anthers sub-sessile, the connective broad, bearing the 2 cells on its edges and produced above them into a broad short truncate process; rudimentary ovary flattish, without stigma. *Female flowers* like the males but with fewer stamens; *ovary* hemispheric, imperfectly 2-celled; stigmas 2, sub-sessile, flat, foliaceous, each divided into 3 or 4 lobes with thick corrugated edges. *Fruit* a dry ovoid berry with coriaceous dark-coloured epicarp, ·75 in. long, and ·6 in. in diam., subtended by the leathery calyx. *Seeds* 2, large, broad, horse-shoe-shaped, flattish, ·5 in. long.

Perak, at low elevations; Scortechini, King's Collector.

A very distinct species with smaller flowers than the other species of the genus.

PLATE 175. *Ternstrœmia Scortechinii*, King. 1, flowering branch; 2, ripe fruits: *of natural size;* 3, andrœcium 4, petal; 5, two anthers; 6, young fruit; 7, young seed: *enlarged.*

PLATE 176.

ACTINIDIA MIQUELII, King in Journ. As. Soc. Bengal, for 1890, *pt.* 2, *p.* 196.

Nat. Ord. Ternstrœmiaceœ.

Slender, scandent, 30 to 60 feet long; young branches cylindric, striate, glabrous, dark-coloured. *Leaves* membranous, ovate, sub-acuminate to sub-rotund, mucronate, minutely glandular-dentate, the base rounded or slightly cordate; upper surface glabrous, rigid, the nerves and midrib minutely pubescent; lower surface pale brown when dry, minutely but densely tomentose; nerves about 5 or 6 pairs, the lower spreading, the upper sub-erect, prominent beneath as are the midrib and transverse veins; length 3 to 4 in., breadth 2·5 to 3·5 in.; petiole 1·25 to 1·5 in., slender. *Cymes* axillary, dichotomous, spreading, rusty-tomentose, on slender ebracteate peduncles 1·25 in. long which lengthen to 3 in. in fruit. *Flowers* numerous, diœcious, ·5 in. in diam.; pedicels ·3 to ·4 in. long. *Sepals* 5, thick, ovate, blunt, densely rusty-tomentose externally. *Petals* 5, larger than the sepals, membranous, oblong-obovate, blunt. *Stamens* in the males very numerous, glabrous; the anthers broadly oblong, blunt, deeply cordate at the base; filaments slender. *Ovary* in the males absent or rudimentary, densely pilose, and with several rudimentary styles. *Female flowers* unknown. *Fruit* ovoid, ·75 in. long, and ·5 in. in diam., baccate, smooth, pulpy, subtended by the persistent calyx and crowned by the remains of 15 to 20 filiform styles. *Seeds* numerous, shining, brown, less than ·1 in. long, ovoid, sub-compressed, pitted and with several longitudinal grooves. *Kadsura pubescens*, Miq. Fl. Ind. Bat. Suppl. 620.

Perak; on trees, at elevations of 3,500 to 4,000 feet, King's Collector, Nos. 5437 and 8789. Distrib.—Eastern Sumatra.

I have carefully examined a type specimen of Miquel's *Kadsura pubescens* from Sumatra named by the author's own hand; and there is no doubt whatever that it is an *Actinidia* and not a *Kadsura;* nor is there any that it is identical with the above quoted numbers of the Calcutta collector from Perak. Miquel is quite wrong in describing his plant as having 3 sepals and 6 petals, there being 5 in each whorl.

PLATE 176. *Actinidia Miquelii,* King. 1, fruiting branch; 2, cyme with young fruit: *of natural size;* 3, stamens; 4, sepal; 5, petal; 6, stamens; 7, ovary; 8, styles: *enlarged.*

PLATE 177.

PYRENARIA KUNSTLERI, King in Journ. As. Soc. Bengal, for 1890, *pt.* 2, *p.* 200.

Nat. Ord. Ternstrœmiaceæ.

A tree 15 to 30 feet high; all parts glabrous except the very apices of the branches, the youngest leaf-buds, and the flowers. *Leaves* elliptic, or elliptic-oblong to oblong-oblanceolate, mostly acuminate, faintly serrate in the upper three-fourths; the base entire, acute; both surfaces, but especially the lower, much pustulate when dry; the lower brown, the upper greenish; midrib and 6 to 8 pairs of erecto-patent main nerves rather prominent below, the latter interarching far from the edge; length 5 to 7 in., breadth 1·8 to 2·5 in., petiole ·3 to ·4 in. *Flowers* ·6 to ·75 in. in diam., on peduncles ·1 in. long; bracteoles 2, opposite, broad, close to the calyx. *Sepals* 5, rotund, coriaceous, pubescent externally. *Petals* 5, larger than the sepals, rotund, glabrous, fleshy with thin edges, white, connate at the base. *Stamens* numerous; anthers broadly ovate, apiculate, 4 or 5 times as long as the slightly flattened filaments, adnate to the base of the petals. *Ovary* ovoid-conic, ridged, adpressed-pubescent, 5-celled. *Style* short, cylindric, glabrous, 5-ridged. *Stigmas* small, acute, connivent. *Fruit* 1·25 to 1·5 in. long, and about as much in diam., broadly ovoid, bluntly 5-ridged, pubescent. *Seeds* few, ovate, sub-compressed, ·6 in. long.

Perak; at elevations of 500 to 2,000 feet. King's Collector.

PLATE 177. *Pyrenaria Kunstleri,* King. 1, flowering branch; 2, flower; 3, ando-gynœcium; 4, ripe fruit; 5, section of ripe fruit; 6, seed; 7, section of seed: *of natural size;* 8 and 9, sepals; 10 and 11, petals; 12, ovary and stamens: *enlarged;* 13, two stamens: *much enlarged.*

PLATE 178.

PYRENARIA WRAYI, King in Journ. As. Soc. Bengal, for 1890, *pt.* 2, *p.* 201.

A bush; the young branches pale, minutely adpressed-pubescent towards the apices as are the leaf-buds. *Leaves* thinly coriaceous, oblong-oblanceolate, shortly acuminate, obscurely crenate-serrate to sub-entire; the base attenuate, entire; both surfaces glabrous, the lower yellowish-green, pustulate when dry, the upper greenish; midrib prominent, especially beneath; main nerves 10 to 12 pairs, interarching ·25 in. from the margin, rather prominent beneath; length 6 to 10 in, breadth 1·75 to 3 in.; petiole ·3 to ·5 in., stout. *Flowers* ·5 in. in diam., buds globose, peduncle very short, glabrous; bracteoles 3, broadly ovate, connate just below the calyx. *Sepals* 6, increasing in size inwards, rotund, minutely pubescent externally. *Petals* 6, rotund, concave, thinner than the sepals, puberulous externally with broad glabrous edges. *Stamens* numerous; anthers broadly ovate, about one-fourth as long as the filaments. *Ovary* shortly ovate-conic, with much white hair, 5- or 6-celled. *Styles* 3, united for half their length; stigmas vertically flattened. Ovules 2 in each cell. *Fruit* sub-globular, bluntly 5-ridged, deciduously pubescent, 1·25 in. in diam. *Seeds* ovoid, sub-compressed, smooth, ·6 in. long, the hilum very large.

Perak, at low elevations; Wray, Scortechini.

Closely allied to *P. Kunstleri;* but the leaves have many more nerves, the flowers are 6-merous with only 3 styles, and the fruit is more globular than in that species.

PLATE 178. *Pyrenaria Wrayi,* King. 1, twig with flower buds; 2, twig with ripe fruit; 3, transverse section of ripe fruit; 4 & 5, seeds: *of natural size;* 6, sepal; 7, petal; 8, stamens; 9, ovaries and styles: *enlarged;* 10 & 11, stamens: *much enlarged.*

PLATE 179A.

GORDONIA MAINGAYI, Dyer in Hook. fil. Fl. Br. Ind. I, 291.

Nat. Ord. Ternstrœmiaceæ.

A tree 30 to 40 feet high; young branches slender, with glabrous pale roughish bark, pubescent towards the apices. *Leaves* coriaceous, broadly oblanceolate, shortly and bluntly acuminate, obscurely serrulate in the upper two-thirds, the lower third gradually attenuate, entire; both surfaces glabrous, the upper greenish, the lower brownish when dry, the midrib bold and sparsely pubescent beneath; lateral nerves 6 pairs, indistinct; length 2·5 to 3 in., breadth 1 to 1·4 in., petiole ·25 in. *Flowers* sub-sessile, ·8 to 1 in. in diam., buds sub-globular; bracts sepals and petals forming a cone, all adpressed-sericeous externally except the glabrous edges; pedicels about ·15 in. long. *Sepals* and petals orbicular, blunt or retuse. *Stamens* numerous; anthers ovoid; filaments much longer, slender. *Ovary* ovoid-conic, vertically ridged, adpressed-sericeous, 4- or 5-celled. *Style* single, angled. Stigmas 4 or 5, acute, connivent. *Capsules* 4-to 5-angled, woody, 1 to 1·25 long, ·5 to ·6 in diam., 4- or 5-celled, backs of valves flat. *Seeds* ·9 in. long, of which three-fourths are wing. King in Journ. As. Soc. Bengal, for 1890, pt. 2, p. 204.

Malacca; Maingay, No. 192. Perak; Scortechini, Wray; at about 1000 feet.

PLATE 179A. *Gordonia Maingayi,* Dyer 1, flowering branch; 2, branch with ripe fruit; 3, petal; 4, stamens; 5, pistil; 6, pistil, with section of ovary; 7 & 8, stamens: *enlarged;* 9, seed: *of natural size.*

PLATE 179B.

GORDONIA IMBRICATA, King in Journ. As. Soc. Bengal, for 1890, *pt.* 2, *p.* 204.

A tree? Young branches rather stout, glabrous, dark purplish-brown when dry. *Leaves* coriaceous, oval-oblong, sometimes slightly oblanceolate, the apex obtuse, slightly emarginate, the edges thickened and slightly recurved, quite entire or very faintly sub-serrulate; the base slightly narrowed, roundish; both surfaces shining, the upper greenish; the lower dull, tinged with brown when dry, midrib bold; nerves about 12 pairs, thick but inconspicuous; length 1·75 to 2·25 in., breadth ·9 to 1·25 in.; petiole ·15 in. stout. *Flowers* only in the upper axils, about 1 in. in diam., axillary, solitary, sub-sessile; the buds elongate-obovoid; the bracts numerous, closely imbricate, passing into the sepals, all orbicular and pubescent externally with broad scarious glabrous edges. *Petals* much larger than the sepals, orbicular, densely and minutely pubescent externally, fleshy with thin glabrous edges. *Stamens* numerous; anthers ovate, about one-fourth of the length of the slender cylindric filaments. *Ovary* ovoid-conic, ridged, adpressed-pubescent, 5-celled. *Style* single, boldly 5-ridged; stigmas distinct, small. *Fruit* slightly under 1 in. long, ·4 in. in diam., 5-angled, adpressed-pubescent, subtended by the elongate imbricate cup formed by the sepals and bracts. *Seeds* ·75 in. in length, of which one-half is wing.

Perak; Scortechini, No. 402b.

Father Scortechini's scanty specimens are accompanied by no notes; but, from the species of *Hymenophyllum* growing on the branches of some of them, I conclude that they were collected probably at elevations of 4,000 or 5,000 feet. The remarkable imbricate buds at once distinguish this species.

PLATE 179B. *Gordonia imbricata*, King. 1, branch with flower and ripe fruit; 2, vertical section of a capsule; 3, seeds removed from capsule; 4, single seed: *of natural size.*

PLATE 180.

DIPTEROCARPUS KUNSTLERI, King in Journ. As. Soc. Bengal, for 1890, *pt.* 2, *p.* 87.

Nat. Ord. Dipterocarpeæ.

A tree 80 to 120 feet high; young branches flattened, at first sparsely covered with minute scurfy deciduous pubescence, ultimately glabrous, but always with oblique tawny-tomentose annuli. *Buds* narrowly cylindric, hoary-canescent. *Leaves* elliptic or sub-rotund-elliptic, very shortly acuminate, the base rounded or sub-cuneate, the edges undulate or sub-cuneate, both surfaces glabrous; main nerves 15 to 18 pairs, oblique, straight, prominent on the lower surface, length 7·5 to 11 in., breadth 4·5 to 7 in., petiole 1·5 to 2 in. *Racemes* 6 to 8 in. long, often bifid, 4- to 6-flowered, glabrous. *Flowers* 2·5 to 3 in. long, glaucous. *Calyx-tube* narrowly obconic, 5-winged. *Petals* linear, obtuse, glaucous. *Fruit* ovoid, an inch and a-half or more long, with 5 wings about ·25 in. wide: accrescent calyx-lobes oblong, obtuse, slightly narrowed towards the base, glabrous, reticulate, 3-nerved, 6 or 7 in. long and about 1·5 in. broad.

Perak: King's Collector, Nos. 3638, 3798, 7508 and 7606.

Allied to *D. grandiflorus*, Blanco; but with larger leaves, smaller fruit and different buds. Allied also to *D. Griffithii*, Miq., but with smaller fruit and different buds. This species has leaves like *D.*

trinervis, Bl. and *D. retusus*, Bl.; but it differs from these in having winged fruit: it also resembles *D. Dyeri*, Pierre, which, however, has longer leaves with hairy petioles and more narrowly-winged fruit.

Plate 180. *Dipterocarpus Kunstleri*, King. 1, leaf and ripe fruit; 2, two flowers from which the petals and stamens have fallen: *of natural size.*

Vatica, Linn.

Large or moderately sized resinous trees. *Leaves* coriaceous, entire, feather-veined and finely reticulate; stipules small, fugacious or inconspicuous. *Flowers* in axillary and terminal panicles, usually tomentose before expansion. *Calyx-tube* short, free, or adnate to the base of the ovary; segments somewhat acute, imbricate, then sub-valvate. *Stamens* 15; anthers oblong, external valves larger, connective apiculate. *Ovary* 3-celled; style short, subulate, or apex clavate or capitate; stigma entire or 3-toothed; ovules 2 in each cell. *Fruit* leathery, indehiscent, 1-seeded, surrounded by and sometimes partly adnate to the accrescent, membranous, nerved and reticulate calyx-lobes, two of which expand into narrow wings 2 or 3 in. long, the other three being much smaller. *Cotyledons* fleshy.

Distrib.—Tropical Asia and chiefly Malaya; species about 10.

PLATE 181.

Vatica perakensis King in Journ. As. Soc. Bengal, for 1893, *pt.* 2, *p.* 103.

Nat. Ord. Dipterocarpeæ.

A tree 60 to 80 feet high; young branches slender, deciduously scurfily stellate-pubescent, the bark rather pale. *Leaves* thinly coriaceous, oblong-lanceolate, or oblanceolate, more or less bluntly acuminate, sometimes caudate, the base cuneate; both surfaces glabrous, the midrib on the upper puberulous; main nerves 8 to 12 pairs, rather prominent beneath; length 3 to 4 in., breadth ·8 to 1·3 in., petiole ·4 to ·5 in. *Panicles* axillary and extra-axillary, cymose, crowded near the ends of the branches, 1 to 2 in. long, minutely pale tomentose as are the ovate-lanceolate calyx-lobes. *Flowers* ·4 in. long. *Petals* narrowly oblong, obtuse, glabrous. *Stamens* 15, anthers ovate and slightly apiculate. *Ovary* minutely tomentose; stigma conical. *Ripe fruit* ·3 in. in diam., globose; the style persistent, minutely tomentose, quite free from the calyx; the two accrescent calyx-lobes oblong-oblanceolate, obtuse, obscurely 5-nerved, 2·75 in. long and ·75 in. broad; minor lobes unequal, lanceolate-acuminate, the largest about ·85 in. long.

Perak: King's Collector, Wray; a common tree. Pangkore: Curtis.

The nearest ally of this is *Vatica Bintamensis*, Benth. and Hook.; but that has rather larger and more coriaceous leaves which are perfectly glabrous; larger flowers with petals scaly externally and a more scurfy inflorescence; moreover, the whole of the accrescent calyx-lobes of its fruit are more coriaceous and the minor lobes are blunter.

Plate 181. *Vatica Perakensis*, King. 1, flowering branch; 2 and 3, ripe fruits with their wings; 4, ripe fruit with all the calyx-lobes removed: *of natural size;* 5, calyx opened up; 5*a*, petal: *slightly enlarged;* 6, stamens; 7, pistils with vertical section of ovary: *much enlarged.*

PLATE 182A.

Vatica nitens, King in Journ. As. Soc. Bengal, for 1893, *pt.* 2, *p.* 104.

A tree 40 to 50 feet high: young branches and petioles densely covered with coarse deciduous scaly stellate tomentum, ultimately cinereous. *Leaves* coriaceous, narrowly oblong, slightly and bluntly acuminate, slightly narrowed to the rounded base; both surfaces, but especially the upper, shining glabrous, finely reticulate, the base on the lower sparsely scaly-tomentose when young; main nerves 18 to 20 pairs, spreading, prominent on the lower surface: length 7 to 10 in., greatest breadth 2 in.; petiole ·5 in., stout. *Ripe fruit* sub-globular, crowned by the persistent style, ·5 in. in diam., adnate for half its length to the calyx; the two large wings of the calyx oblong, slightly oblanceolate, obtuse, 2·5 to 3 in. long and ·8 to ·9 in. broad, the 3 shorter wings ovate-acuminate, ·8 in. long; all boldly 5-nerved and shining.

Penang: Curtis, No. 1404.

This fine species is known only by Mr. Curtis' imperfect specimens. It is very distinct, being at once recognisable amongst the Indian species of *Vatica* by the size of its leaves and calyx-wings.

Plate 182A. *Vataca nitens*, King. 1, fruiting branch; 2, fruit with the calyx-lobes removed: *of natural size.*

PLATE 182B.

Vatica Lowii, King in Journ. As. Soc. Bengal, for 1893. *pt.* 2, *p.* 103.

A tree 60 to 80 feet high: young branches, petioles, inflorescence and calyx densely rusty scurfy-tomentose with stellate hair intermixed, the branches ultimately glabrous and with dark bark. *Leaves* coriaceous, oblong, sub-acute, the base rounded; both surfaces glabrous, the midrib puberulous on the upper; main nerves 13 to 15 pairs, spreading, slightly prominent beneath; length 2·5 to 3·5 in., breadth 1 to 1·5 in., petiole ·3 to ·5 in. *Panicles* axillary and terminal, much crowded towards the ends of the branches; ·75 to 1·5 in. long. *Flowers* ·25 in. long. *Calyx-lobes* 5, oblong or lanceolate, unequal, oblique. *Petals* 5, narrowly oblong, obtuse, almost glabrous. *Stamens* short, unequal-sided, apiculate. *Ovary* depressed-globose, tomentose, style capitate. *Ripe fruit* globular, ·25 in. in diam., deciduously rufus-scurfy; the style persistent, quite free from the calyx; two large calyx-wings narrowly oblong, sub-acute, scarcely narrowed at the base, 5-nerved, 2·25 to 3 in. long, and ·6 in. broad; the three smaller lobes sub-equal, about ·5 or ·6 in. long, lanceolate, sub-acute.

Perak: Scortechini, No. 2108; King's Collector, No. 7496.

This species is closely allied to *V. Maingayi*, Dyer; but has smaller flowers, and rather larger leaves with considerably longer petioles.

Plate 128B. *Vatica Lowii*, King. 1, flowering branch; 2 fruiting branch: *of natural size;* 3, flower; 4, flower a little older and with the petals removed; 5 and 6, petals; 7, stamen; 8, pistil: *enlarged;* 9, section of ovary: *much enlarged.*

PLATE 183A.

Vatica cinerea, King in Journ. As. Soc. Bengal, for 1893, *pt.* 2, *p.* 104.

A tree about 40 feet high; young branches rufescent-puberulous at the very tips, otherwise glabrous and cinereous. *Leaves* thinly coriaceous, ovate-oblong to ovate-lanceolate, sub-acute, the base rounded or sub-cuneate; both surfaces glabrous, finely reticulate when dry; main nerves 6 to 8 pairs, spreading, faint; length 2·25 to 3·5 in., breadth ·75 to 1·5 in., petiole ·3 to ·5 in. *Panicles* mostly axillary, spreading, rusty scurfy-tomentose, 1·25 to 3 in. long. *Flowers* ·45 in. long. *Calyx-lobes* sub-equal, lanceolate or oblong, sub-acute, tomentose on both surfaces. *Petals* oblong-lanceolate, sub-acute, the half of the outer surface which is outside in æstivation pubescent, otherwise glabrous. *Stamens* obtusely apiculate. *Ovary* depressed, minutely tomentose; stigma capitate. *Fruit* (not quite ripe) globular, umbonate, attached for half its length to the calyx. The two larger calyx-wings oblanceolate-oblong, obtuse or sub-acute, 5-nerved, flocculent-puberulous near the base when young, ultimately glabrous, 2 in. long and ·75 in. wide; the 3 smaller wings lanceolate, obtuse, ·5 in. long.

Langani: Curtis, Nos. 2797 and 2798. Kedah: Curtis, Nos. 2096 and 2514.

When dried, the leaves of this are of a dull gray colour—hence the specific name. Its fruit resembles that of the next species, but the leaves have fewer and less prominent nerves.

PLATE 183A. *Vatica cinerea*, King. 1, flowering branch; 2, young fruit; 3, mature fruit: *of natural size;* 4, flower dissected; 5, pistils with the calyx-lobes cut away; 6, stamens: *enlarged.*

PLATE 183B.

VATICA CURTISII, King in Journ. As. Soc. Bengal, for 1893, *pt.* 2, *p.* 105.

A tree about 40 feet high: young branches, petioles, inflorescence and calyx brownish scurfy-pubescent, ultimately glabrous. *Leaves* ovate-oblong, sub-acute, the base rounded or sub-cuneate, both surfaces quite glabrous, reticulate; main nerves 8 to 13 pairs, oblique, rather prominent beneath; length 3 to 5 in., breadth 1·3 to 2·5 in., petiole ·3 to ·45 in. *Racemes* axillary, few-flowered, 1 to 1·25 in. long. *Flowers* ·35 to ·45 in. long. *Calyx-lobes* unequal, the two longer narrowly oblong, obtuse; the three shorter lanceolate-acuminate. *Petals* elliptic, slightly oblique, blunt, glabrous except the pubescent edge which is external in the bud. *Ripe fruit* globular, ·3 in. in diam., adherent to the calyx for half its length, the larger calyx-lobes oblong-oblanceolate, usually obtuse, rarely sub-acute, 5-nerved, 1·75 to 2·5 in. long, and ·7 in. broad; the smaller wings ·4 to ·6 in. long.

Penang: Curtis, No. 1579.

PLATE 183B. *Vatica Curtisii*, King. 1, fruiting branch; 2, flowering branch with the leaves removed; 3, ripe fruit: *of natural size;* 4, flower from which the petals have been removed and of which the calyx-lobes have begun to grow; 5, petal; 6 and 7, stamens; 8, pistils; 9, section of ovaries: *enlarged.*

PLATE 184.

PENTACME MALAYANA, King in Journ. As. Soc. Bengal, for 1893, *pt.* 2, *p.* 107.

Nat. Ord. Dipterocarpeæ.

A tree 40 to 50 feet high; young branches rather stout, dark-coloured, glabrous. *Leaves* sub-coriaceous, rotund-ovate to broadly elliptic, the apex shortly and bluntly acuminate, the base rounded or slightly emarginate; both surfaces glabrous, pale when dry; main nerves 15 to 18 pairs, spreading, prominent on both surfaces; length 5 to 7 in., breadth 2·75 to 4·5 in., petiole ·75 to 1·1 in. *Panicles* axillary, lax, few-flowered, 2·5 to 5 in. long. *Flowers* ·75 in. long and about as much in diameter when open, pedicelled. *Calyx-lobes* more or less broadly ovate, acuminate, minutely tomentose outside, imbricate, two being quite external. *Petals* three times as long as the calyx, elliptic, spreading, puberulous on one half outside, and glabrous on the other, quite glabrous inside. *Stamens* 15, equal, erect, the filaments short and broad; the anthers elongate, narrow, with 5 apical awns, one of which is deflexed and rather shorter and thicker than the other four. *Ovary* ovoid, sub-glabrous, much shorter than the filiform style, stigma minute. *Ripe fruit* ovate, apiculate, 1 in. long, glabrous; calyx-wings all enlarged and reticulate except at the base; the three outer narrowly oblong, obtuse, and narrowed to the concave base, 9-nerved, 4 to 4·5 in. long, and ·65 to ·75 in. broad; the two inner lobes much narrower and fewer-nerved, about 2·5 in. long, or even shorter.

Langkani; Curtis, No. 2095.

The petals of this species are spreading, and the flower has quite an unusual *facies* for the order. It is at once distinguished by its curiously 5-awned anthers. Four of these awns are the produced apices of the anther cells, the fifth (the thicker and deflected one) is a prolongation from the connective.

PLATE 184. *Pentacme malayana*, King. 1, leaf twig; 2, flower; 3, the same dissected; 4, ripe fruit with one of the three enlarged calyx-lobes removed: *of natural size;* 5 and 6, anthers; 7 pistil: *enlarged.*

SHOREA, Roxb.

Glabrous, mealy, or pubescent resinous trees. *Leaves* entire or sub-repand, pinnate-veined; stipules large, coriaceous and persistent, or minute and fugacious. *Flowers* in axillary or terminal, lax, cymose panicles; bracts persistent, caducous, or 0. *Sepals* ovate or lanceolate, imbricate, 3 being external and 2 internal. *Stamens* 15 or 20, or 30: anthers ovate or oblong, rarely linear; connective subulate-cuspidate, rarely inappendiculate; valves obtuse, rarely cuspidate, equal, or the outer slightly larger. *Ovary* 3-celled, cells 2-ovuled; style subulate, stigma entire or 3-toothed. *Fruit* with leathery, rarely with woody, pericarp, 1-celled, 1-seeded, closely surrounded by the bases of the persistent, usually accrescent, sepals, the 3 outer, or more rarely, all, and sometimes none, of which are developed into 7- to 10-veined reticulate membranous linear-oblong wings. *Cotyledons* fleshy, unequal, usually enclosing the superior radicle.

DISTRIB.—Tropical Asia and chiefly the Malayan Archipelago; species about 60.

PLATE 185A.

SHOREA CURTISII, Dyer MSS. in Herb. Kew.

A tree 100 to 150 feet high; young branches slender, at first minutely stellate-puberulous, ultimately dark-coloured and glabrous. *Leaves* coriaceous, oblong-lanceolate bluntly acuminate; the base sub-cuneate, or sometimes almost rounded; upper surface of young leaves minutely pubescent, of adults glabrescent or quite glabrous, the lower uniformly covered with very minute rufescent (young), or pale (adult) tomentum; main nerves 10 to 14 pairs, ascending, curving slightly, prominent beneath: length 3 to 4 in., breadth 1·2 to 1·4 in., petiole ·4 to ·6 in. *Panicles* axillary or terminal, 1·5 to 3 in. long; the rachis slender, glabrous. *Flowers* about ·3 in. long, in distichous secund rows of 4 or 5, on the short lateral branchlets, enveloped while in bud by broad deciduous puberulous bracts. *Sepals* ovate, tomentose outside, glabrous inside, slightly unequal. *Petals* twice as long as the calyx, linear-oblong, obtuse, stellate-pubescent outside, glabrous inside. *Stamens* 15, in three rows; the filaments elongate, broad (those of the outer row longest); anthers short, ovoid-globose, not apiculate. *Ovary* elongated-ovoid, tomentose in the upper, glabrous in the lower half, *style* short, *stigma* small. *Ripe fruit* narrowly ovoid, apiculate, ·75 in. long, pale tomentose; *calyx-wings* all enlarged and membranous, free from the fruit; the three outer linear-oblong, 8-nerved, 2·25 in. long, and about ·5 in. broad; the two inner about 1 in. long, linear and with fewer nerves. King in Journ. As. Soc. Beng., for 1893, pt. 2, p. 111.

Penang: Curtis, Nos. 427, 1394 and 1395. Perak: King's Collector, No. 8143.

The vernacular name of this in Penang is *Maranti Tai*. The tomentum on the lower surface of the leaves is very minute and can be seen only by using a good lens.

PLATE 185A. *Shorea Curtisii*, King. 1, branch with inflorescence in bud; 2, ripe fruit; 3, ripe fruit with one of the larger wings removed: *of natural size*; 4, one of the ultimate branches of the inflorescence in bud shewing the large distichous concave bracts; 5, one of the bracts separated; 6, flower-bud; 7, expanded flower: *enlarged*. 8, flower-bud; 9, stamens: *much enlarged.*

PLATE 185B.

SHOREA RIDLEYANA, King in Journ. As. Soc. Bengal, for 1893, *pt.* 2, *p.* 115.

A tree 60 or 80 feet high; young branches slender, dark brown, lenticellate, nearly glabrous. *Leaves* ovate-lanceolate, shortly acuminate, the base rounded; both surfaces glabrous, the upper shining; main nerves 9 or 10 pairs, curved, spreading, thin but slightly prominent beneath; length 2·5 to 4 in., breadth 1·1 to 1·75 in.; petiole ·4 to ·5 in., rugulose. *Panicles* axillary and terminal, 1·5 to 2 in. long, densely stellate-puberulous. *Flowers* ·2 in. long, pedicellate. *Sepals* sub-equal, oblong, obtuse, tomentose outside, glabrous inside. *Petals* oblong, slightly oblique, obtuse, glabrous inside on the lower puberulous on the upper half. *Stamens* 15, sub equal, the filaments dilated in the lower half; anthers shorter than the filaments, ovate, the connective produced into an awn longer than the anther. *Ovary* ovoid-conical, minutely tomentose in the upper half. *Style* short, conical; stigma minute. *Fruit* (immature) ovoid, apiculate, minutely pale tomentose; *sepals* all enlarged, membranous, reticulate and concave at the base; the three outer linear-oblanceolate, obtuse, narrowed to the concave base, 5-nerved, 2 to 2·25 in. long and ·4 in. broad; the two inner of the same shape, but only 1-nerved, narrower and much shorter.

Perak: King's Collector, Nos. 3571 and 3617.

This a good deal resembles *S. Maxwelliana*, King; but its leaves have more nerves, its slightly oblique petals are not saccate at the base, its ovary is ovoid-conical and minutely tomentose with a short style; whereas in *S. Maxwelliana* the petals are saccate at the base, and the ovary is hemispheric with a long style.

PLATE 185B. *Shorea Ridleyana*, King. 1, branch with young fruit; 2, branch with flowers: *of natural size;* 3, sepal; 4, petal; 5, ovary: *enlarged.*

PLATE 186.

SHOREA KUNSTLERI, King in Journ. As. Soc. Bengal, for 1893, *pt.* 2, *p.* 116.

A tree 60 to 100 feet high; young branches slender, rusty-puberulous, their bark brown. *Leaves* coriaceous, elliptic, abruptly and shortly acuminate, the base rounded or slightly cuneate, both surfaces glabrous, the lower with a few stiff white hairs on the midrib and nerves; main nerves 6 to 8 pairs, curved, ascending, prominent on the lower surface; length 4 to 5 in., breadth 2 to 2·4 in., petiole ·5 to ·7 in. *Panicles* axillary and terminal, 4 to 6 in. long, lax, few-flowered, scaly-puberulous *Flowers* ·5 in. long, sub-sessile, 4 or 5 together on the short branches of the panicles, secund, bracteate; the bracts broadly ovate, puberulous. *Sepals* sub-equal, broadly ovate, acute, tomentose outside, the edges ciliate, glabrous inside. *Petals* linear-oblong, obtuse; the bases obliquely expanded, sericeous externally, glabrous internally. *Stamens* 15, sub-equal; the filaments longer than the anthers, flattened; anthers ovate, short, the connective terminated by a curved awn much longer than the stamen. *Ovary* elongate-conic, puberulous, style short. *Ripe fruit* broadly ovoid, tapering into a cone and crowned by part of the style, adpressed pale tomentose. *Sepals* membranous, reticulate; the three larger narrowly oblong, obtuse, tapering to the concave non-reticulate base, 9-nerved, 3·5 in. long and ·7 in. broad; the two inner 2 in. long, linear, 3-nerved.

Perak: King's Collector, Nos. 3474 and 3705.

This species is allied to *S. bracteolata*, Dyer, but its leaves have fewer nerves, smaller flowers, narrower petals, and a short style.

PLATE 186. *Shorea Kunstleri*, King. 1, flowering branch; 2, ripe fruit; 3, ripe fruit with the three outer accrescent calyx-wings removed; 4, outer accrescent calyx-wing; 5, inner accrescent calyx-wing; 6, ripe fruit; 7, section of ripe fruit: *of natural size*; 8, calyx, ovary and style; 9, petals and stamens: *enlarged*; 10, stamens: *much enlarged.*

PLATE 187A.

SHOREA CILIATA, King in Journ. As. Soc. Bengal, for 1893, *pt.* 2, *p.* 118.

A medium-sized tree; young branches slender, dark-coloured, deciduously hoary-puberulous. *Leaves* coriaceous, lanceolate or oblong-lanceolate, acuminate, the base cuneate; both surfaces glabrous, minutely reticulate, the lower whitish when young, pale brown when dry; main nerves 5 to 9 pairs, ascending, curved, shining on the lower surface; length 2·5 to 3·5 in., breadth ·8 to 1·5 in., petiole ·75 to ·9 in. *Panicles* 2 to 2·5 in. long, axillary and terminal, little-branched, few-flowered, hoary. *Flowers* ·5 in. long. *Sepals* ovoid-deltoid, obtuse, outside tomentose, inside glabrous. *Petals* three times as long as the sepals, narrowly oblong, obtuse, slightly expanded at the base, adpressed-sericeous outside, glabrescent inside. *Stamens* 30, in fascicles of 3, unequal, the shorter with undilated filaments, the longer with filaments dilated in the lower half; all with the connective produced into an apical process crowned by 3 to 5 spreading ciliæ. *Ovary* ovoid-conic, sericeous, with a short glabrous style. *Fruit* (immature) ovoid, apiculate, pale-tomentose, ·5 in. long; accrescent sepals membranous, reticulate; the three outer narrowly oblong, reticulate, 7-nerved; the two inner 2 in.

long, and ·3 in. broad, narrowed to above the concave base; the two inner 1 in. long, linear-lanceolate, few-nerved.

Penang: Curtis, No. 1578.

Known only by Curtis' specimens, and readily recognisable by its beautifully ciliate-crested anthers.

Plate 187A. *Shorea ciliata*, King. 1, flowering branch; 2, fruiting branch; *of natural size;* 3 & 4, sepals; 5 and 6, petals; 7 and 8, anthers; 9, ovary; 10, section of same: *enlarged.*

PLATE 187B.

Hopea Curtisii, King in Journ. As. Soc. Bengal, for 1893, *pt.* 2. *p.* 124.

Nat. Ord. Dipterocarpeæ.

A tree 50 to 60 feet high; young branches slender, dark-coloured, lenticellate, almost glabrous. *Leaves* coriaceous, broadly ovate to ovate-oblong, shortly acuminate or acute, the base sometimes slightly unequal-sided, rounded, rarely sub-cuneate; both surfaces glabrous, the upper slightly puberulous on the midrib near the base, the lower with several hairy glands at the base, the midrib sparsely and minutely stellate-puberulous; main nerves 10 to 13 pairs, curving, ascending, prominent beneath; length 3·5 to 4·5 in., breadth 1·75 to 2·5 in.; petiole ·4 in., puberulous when young. *Panicles* axillary and terminal, lax, few-flowered. *Flowers* about ·2 in. long, pedicelled. *Sepals* broadly ovate, blunt, concave, tomentose outside, glabrous inside; the inner two rather smaller and more glabrous than the others. *Petals* oblong, oblique, falcate, obtuse, partially tomentose outside, glabrous inside. *Stamens* 10, the filaments short, dilated; anthers ovate, short, the connective with an apical awn longer than the anther. *Ovary* broadly ovate, puberulous at the truncate apex, otherwise glabrous, style short. *Ripe fruit* ovoid-globular, apiculate, pale striate, ·35 in. long; outer two sepals accrescent, narrowly-oblong, reticulate, membranous, obscurely 7- to 8-nerved, obtuse, slightly narrowed to the concave smooth base, 1·75 to 2·5 in long and from ·35 to ·6 in. broad; the three inner non-accrescent sepals about as long as the fruit.

Penang: Curtis No. 1562. Perak: King's Collector, 8161.

Plate 187B. *Hopea Curtisii*, King. 1, fruiting branch; 2, nearly ripe fruit: *of natural size.*

PLATE 188.

Shorea Thiseltoni, King in Journ. As. Soc. Bengal, for 1893, *pt.*, 2, *p.* 122.

A tree 60 to 80 feet high; young branches rather stout, the bark dark-coloured and lenticellate, but covered at first by a pale-grey, deciduous pellicle. *Leaves* coriaceous, elliptic-oblong to elliptic, rarely oblong, sometimes slightly obovate, sub-acute, slightly narrowed to the rounded base; both surfaces glabrous, the lower when very young sparsely lepidote, puberulous especially on the midrib and nerves, brown when dry: main nerves 8 to 11 pairs, ascending, slightly curved, bold and prominent on the under surface like the midrib; length 5 to 7 in., breadth 2·25 to 3·25 in.; petiole ·6 to ·8 in, stout. *Panicles* axillary and terminal, 2 to 3 in. long, velvety, the flowers rather crowded, apparently ebracteolate. *Flowers* sessile, ·5 or ·6 in. long. *Sepals* ovate, sub-acute, unequal; the 3 outer tomentose outside, glabrous inside; the 2 inner smaller, nearly glabrous, the edges ciliate. *Petals* much longer than the sepals, linear-oblong, obtuse, expanded at the base, glabrous, except one-half of the outer surface which is adpressed-pubescent. *Stamens* 15, in 3 rows, the filaments of all dilated, unequal; the anthers shortly ovate, each with a short apical appendage from the connective. *Ovary* narrowly conical, tomentose, tapering into the short glabrous style, stigma minute. *Ripe fruit* narrowly ovoid, apiculate, minutely pale-tomentose, substriate, 1·2 in. long, and ·6 in. in diam., the pericarp thick and woody. *Persistent sepals* with much thickened concave woody bases, forming a cup embracing the lower half of the fruit, the apices of the outer three prolonged into membranous linear-oblong sub-obtuse wings, one of them exceeding the fruit and sometimes 1·5 in. long; one of the inner sepals shortly winged, the other often broad obtuse and not winged.

Perak: common King's Collector.

In this plant the fruit is much larger than is usual in the genus, and its pericarp is hard and thick. The bases of the sepals are greatly thickened and concave, and they form a cup which embraces closely, but does not adhere to, the lower half of the fruit, the apices of some of them being winged as above described. In these respects the species resembles certain other Malayan species of *Shorea*, e.g., *S. Martiniana* Scheff., *S. scaberrima*, and *S. stenoptera*, Burck. Judging from the leaf-specimens on which Miquel founded his *Hopea Singkawang*, that plant must be a close ally of this. A specimen (flower only) collected by H. O. Forbes in Sumatra (Herb. No. 2952) must also be closely allied to this. It differs however by its conspicuously bracteolate inflorescence. Beccari's Nos. 2631 and 3507, which form the types of Heim's species *S. brachyptera*, are also allied to this.

PLATE 188. *Shorea Thiseltoni*, King. 1, flowering branch; 2, branch with young fruit; 3, ripe fruits; 4, ripe fruit removed from the accrescent calyx: *of natural size*; 5, flower-bud; 6, calyx, ovary, and style; 7, petal; 8, young fruit; 9 to 13, accrescent sepals of young fruit; 14, group of stamens, showing one of each of the three rows: *enlarged*; 15 & 16, stamens: *much enlarged.*

PLATE 189A.

HOPEA INTERMEDIA, King in Journ. As. Soc. Bengal, for 1893, *pt.*, 2, *p.* 126.

A tree 60 to 80 feet high; young branches rather dark-coloured, puberulous. *Leaves* coriaceous, ovate to ovate-lanceolate, caudate-acuminate, the base cuneate, both surfaces glabrous; main nerves numerous, faint; length 2·5 to 3 in., breadth 1 to 1·5 in.; petiole ·35 to ·6 in., slender, puberulous but finally glabrous. *Panicles* as in *H. Mengarawan*, the flowers pedicellate. *Sepals* sub-equal; the two outer ovate, acuminate; the three inner broader and more obtuse, all resinous outside, glabrous and smooth inside. *Petals* twice as long as the sepals, narrowly oblong, obtuse, falcate, densely sericeous externally, glabrous within. *Stamens* 12; the filaments dilated, shorter than the anthers; the anthers short, crowned by a straight awn from the connective longer than the stamen. *Ovary* hour-glass shaped; style short, stigma small. *Ripe fruit* ovoid, apiculate, ·3 to ·5 in. long, pale, striate; the two outer sepals accrescent, narrowly oblong-obtuse, narrowed to the base, reticulate, obscurely 5- to 7-nerved, 1·25 to 1·75 in. long and ·25 in. broad; the inner three sepals not accrescent, not longer than the fruit, and closely embracing it.

Penang: Curtis, No. 425 and 1398. Perak: King's Collector, No. 3709.

PLATE 189A. *Hopea intermedia*, King. 1, flowering branch; 2, young fruit; 3, mature fruit: *of natural size*; 4, flower-bud; 5, flower; 6, calyx cut open to show ovary; 7, petal with three stamens at its base; 8, ovary: *enlarged*; 9, three stamens: *much enlarged.*

PLATE 189B.

Retinodendron Kunstleri, King in Journ. As. Soc. Bengal, for 1893, *pt.* 2 *p.* 129.

Nat. Ord. Dipterocarpeæ.

A tree 20 to 50 feet high, sometimes a shrub; young branches, slender, deciduously stellate-puberulous. *Leaves* thinly coriaceous, elliptic-oblong to oblong-lanceolate, sometimes slightly obovate, sub-acute or shortly and bluntly acuminate; the base cuneate, rarely rounded; upper surface glabrous, the midrib and nerves pubescent; the lower quite glabrous; main nerves 10 to 13 pairs, spreading, slightly prominent beneath: length 2·25 to 4·5 in., breadth 1·25 to 1·75 in., petiole ·25 to ·4 in. *Racemes* axillary, 1 to 1·5 in. long, sparsely scaly. *Flowers* ·4 in. long. *Calyx-lobes* ovate-lanceolate, puberulous. *Petals* oblong-elliptic, oblique, obtuse, puberulous outside. *Anthers* sub-sessile, each with a stout apiculus as long as itself. *Ovary* puberulous, stigma capitate. *Ripe fruit* globular, with a long curved apical beak, glabrous, about ·25 in. in diam. *Calyx-lobes* all accrescent, sub-equal, oblong, tapering slightly to the sub-obtuse apex, the base slightly auricled, thickly membranous, glabrous, 3-nerved, the longest about 1·3 in. long and ·35 in. broad, loosely surrounding, and longer than, the fruit.

Perak: Scortechini, Wray, King's Collector; very common at low elevations.

In this species all the five calyx-lobes are accrescent and of nearly equal size. They are quite free from the ripe fruit, round which they form a loose semi-inflated investiture. Its nearest ally is *Vatica bancana*, Scheffer (= *Retinodendron bancanum*).

Plate 189B. *Retinodendron Kunstleri*, King. 1, flowering branch; 2, ripe fruits; 3, a ripe fruit with the accrescent calyx-lobes removed; 4, accrescent calyx-lobe: *of natural size;* 5, calyx, ovaries and style; 6, petal; 7, ovary and style; 8, anthers: *enlarged.*

PLATE 190.

Retinodendron Scortechinii, King in Journ. As. Soc. Bengal, for 1893, *pt.* 2, *p.* 128.

A tall tree; young branches rather stout, densely furfuraceous-pubescent. *Leaves* coriaceous, oblong, tapering to the sub-acute apex; the base slightly narrowed, rounded: both surfaces glabrous; main nerves 14 to 18 pairs, spreading, curving, prominent on the lower, sub-depressed on the upper surface when dry, the transverse venation bold: length 7 to 10 in., breadth 2·3 to 3·25 in., petiole ·6 to ·75 in. *Panicles* crowded towards the apices of the branches, mostly axillary, 2 to 2·5 in. long, the rachises brownish flocculent stellate-tomentose, as is the calyx externally. *Flowers* ·6 in. long. *Calyx-lobes* 5, ovate. *Petals* 5, thick, oblong, blunt, puberulous externally, glabrous within. *Anthers* 15, elliptic, apiculate, the filaments very short. *Ovary* broadly ovoid from a truncate base, minutely tomentose, stigma clavate. *Ripe fruit* sub-globular, sub-rugose, vertically grooved, minutely rufous-scurfy, about ·75 in. in diam., laxly embraced in the lower half by the broadly ovate, membranous, many-nerved, reticulate, sub-equal calyx-lobes.

Perak: Scortechini, Nos. 1940 and 1942.

The calyx-lobes are nearly equal in size, quite free from the fruit, much shorter, and they embrace only its lower half. This species is allied to *Retinodendron Rassak*, Korth. (Nat. Gesch. Ned. Ind. 56, t. 8), but has broader leaves and much more condensed panicles than that species.

Plate 190. *Retinodendron Scortechinii*, King. 1, flowering branch; 2, branch with ripe fruit: *of natural size;* 3, calyx; 4 & 5, petals; 6 & 7, stamens; 8, ovary, style, and stigma; 9, section of ovary: *enlarged.*

Balanocarpus, Beddome.

Nat. Ord. Dipterocarpeæ.

Glabrous or puberulous, rarely scabrid, resinous trees, with inconspicuous fugaceous stipules. *Leaves* entire, coriaceous or membranous, penni-nerved. *Flowers* secund, sessile or shortly pedicelled. *Sepals* distinct or united at the base, imbricated, two quite external to the others; in fruit sub-equal, only slightly enlarged, woody, thickened, and forming a 5-lobed cup round the base of (but rarely enveloping) the fruit, not adnate to it and never expanding into wings. *Petals* elliptic, obliquely acuminate, the apices slightly inflexed in bud or not inflexed at all. *Stamens* 15, attached to the bases of the petals, in 3 rows, or 10 in 2 rows, sub-equal, the filaments much dilated at the base, the connective prolonged into a straight apical awn longer than the ovate anther. *Torus* flat. *Ovary* 3-celled, cells 2-ovuled, ovules collateral. *Style* short. *Stigma* minute, entire. *Fruit* oblong or sub-globose, apiculate; the pericarp ligneous or sub-ligneous. *Seed* solitary, erect; cotyledons fleshy, plano-concave, the larger 2- or 3-lobed, or entire; the radicle prominent. Distrib.—Southern Peninsular India, Malaya;—probably 12 species.

PLATE 191A.

Balanocarpus Curtisii, King in Journ. As. Soc. Bengal, for 1893, *pt.* 2, *p.* 131.

A tree 20 to 30 feet high; young brances slender, the bark dark-coloured, puberulous. *Leaves* membranous, ovate-lanceolate, bluntly caudate-acuminate, the base slightly cuneate; both surfaces glabrous, dull; main nerves 8 to 10 pairs, spreading, faint and scarcely more prominent than the secondary nerves; length 2 to 2·5 in., breadth ·75 to 1·15 in., petiole ·1 to ·15 in. *Panicles* axillary and terminal, shorter than the leaves, glabrescent, lax, each with a few 3- to 5-flowered spreading branches. *Flowers* secund, shortly pedicelled, ·15 in. long. *Sepals* distinct, sub-equal, thick, rotund-ovate very obtuse, puberulous outside, glabrous inside, the edges slightly ciliate. *Petals* elliptic, obliquely shortly and bluntly acuminate, glabrescent inside, partly puberulous and partly glabrous outside. *Stamens* 15, in 3 rows, sub-equal; the filaments slightly longer than the anthers, dilated: anthers broadly elliptic, truncate, the connective produced into an apical awn longer than the stamen. *Ovary* cylindric, truncate, glabrous, the style short and stigma minute. *Fruit* smooth, globular, apiculate, crowned by the sub-sessile discoid stigma, enveloped by, but not adherent to, the slightly thickened sepals, ·25 to ·3 in. in diam. (calyx included).

Penang: Curtis, No. 1406. Perak: King's Collector, Nos. 3171, 3294, 6543; Wray, No. 2860.

Plate 191A. *Balanocarpus Curtisii,* King. 1, branch with flowers and flower-buds; 2, twig with ripe fruit: *of natural size;* 3, flower bud; 4, petals opened up showing the stamens *in situ*; 5, ovary; 6, section of ovary: *enlarged;* 7, stamens: *much enlarged.*

PLATE 191B.

Balanocarpus penangianus, King in Journ. As. Soc. Bengal, for 1890, *pt.* 2, *p.* 131.

A tree 40 to 50 feet high; young branches slender, dark-coloured, lenticellate, slightly puberulous at the very tips. *Leaves* coriaceous, ovate-lanceolate or ovate-acuminate, often caudate-acuminate, the base slightly cuneate or almost rounded, the edges slightly undulate, both surfaces glabrous; main nerves 7 to 8 pairs, spreading and curving upwards, not prominent on either surface; length 1·75 to 4 in., breadth ·8 to 1·6 in., petiole ·25 to ·4 in. *Panicles* axillary and terminal, hoary-pubescent, many-flowered; the flowers secund, 7 to 9 on each lateral branchlet, pedicelled, ·2 to ·25 in. long. *Sepals* sub-equal, broadly ovate, sub-acute, yellowish-pulverulent, puberulous externally, glabrous internally. *Petals* oblong, obtuse, twisted and with the apices reflexed in æstivation, spreading when expanded, minutely yellowish-pulverulent, tomentose outside, glabrous inside. *Stamens* 15, sub-equal; apical awn curved, longer than the anther. *Ovary* ovoid, narrowing upwards into the style, stigma minute. *Fruit* ovoid, very slightly apiculate, striate, pale pubescent, about ·6 in. long and ·3 in. in diam., the persistent calyx covering the lower fourth of the fruit, sub-glabrous, thickened and concave at the base; the teeth deltoid, spreading. *Richetia penangiana*, Heim in Bull. Soc. Linn. Paris, 1891, p. 980.

Penang: on Government Hill, at an elevation of about 1,000 feet, Curtis, Nos. 1429 and 1393; Hullett, No. 188; King's Collector, No. 1534. Perak: King's Collector, Nos. 3333, 3707.

The leaves of this species, although larger, resemble those of *B. Curtisii*: but the fruits of the two are quite different. One of Mr. Curtis' specimens, (No. 429 communicated from Kew), forms the type of a new genus called *Richetia*, which M. Heim has founded (l. c. p., 975, also in his "Recherches sur les Dipterocarpacées" p. 50), without having seen its flowers. I have retained for this M. Heim's specific name, while referring it to Beddome's older genus. The vernacular name of the species is *Dammar Etam*.

PLATE 191B. *Balanocarpus penanginus*, King. 1, flowering branch; 2, fruiting branch: *of natural size*; 3, flower bud: *enlarged*; 4, calyx and pistil; 5, petal and stamens: *much enlarged*; 6 and 7, stamens; 8, ovary; 9, section of ovary: *very much enlarged*.

PLATE 192.

BALANOCARPUS MAXIMUS, King in Journ. As. Soc. Bengal, for 1890, *pt.* 2, *p.* 133.

A tree 60 to 80 feet high, all parts except the inflorescence glabrous, young branches rather stout; the bark, loose, papery, lenticellate, pale. *Leaves* thinly coriaceous, oblong to elliptic-oblong, sub-acute, slightly narrowed to the rounded base; main nerves 7 to 9 pairs, slightly prominent beneath, the transverse veins slightly prominent when dry; length 5 to 7 in., breadth 2 to 2·5 in., petiole ·5 to ·6 in. *Panicles* axillary or terminal, about half as long as the leaves, few-flowered, minutely tomentose. *Flowers* subsessile, ·6 or ·7 in. long. *Sepals* broadly ovate, the outer two tomentose the inner three more or less glabrous externally, all glabrous internally, the inner two with ciliate margins. *Petals* much longer than the sepals, narrowly oblong, the apex erose, expanded and concave at the base, adpressed-pubescent outside and towards the apex inside, otherwise glabrous. *Stamens* 10, in two rows; anthers with a deflexed terminal appendage from the connective. *Ovary* elongate, narrowly conical, sericeous. *Style* rather short, glabrous, stigma small. *Ripe fruit* cylindrical, tapering to each end but most to the apiculate apex; pericarp woody, striate, sub-glabrous, pale-brown when dry, 1·75 to 2·25 in. long, and ·6 or ·7 in. in diam. *Persistent sepals* fibrous, forming a toothed cup about ·5 in. deep and embracing the base of the fruit.

Perak: King's Collector, Nos. 7987 and 8006.

The flowers of this fine species do not exactly answer to Beddome's diagnosis of the genus *Balanocarpus*, inasmuch as they have 10 instead of 15 stamens, and neither of the cotyledons is lobed. In other respects the flowers and fruit agree perfectly.

PLATE 192. *Balanocarpus maximus*, King. 1, flowering branch; 2, ripe fruit: *of natural size; 3*, flower-bud; 4 petal; 5 to 9, the sepals; 10 and 11, anthers; 12, ovary: *all enlarged.*

PLATE 193.

BALANOCARPUS HEMSLEYANUS, King in Journ. As. Soc. Bengal, for 1893, *pt.* 2, *p.* 134.

A tree 50 to 100 feet high; young branches rather stout, rough, minutely lenticellate, puberulous. *Leaves* coriaceous, elliptic-oblong, sometimes slightly obovate, shortly cuspidate, slightly narrowed to the rounded or sub-emarginate base: upper surface glabrous except the minutely tomentose midrib; the lower scabrid from minute rigid stellately hairy tubercles which are most abundant on the stout midrib and nerves: main nerves 15 to 20 pairs, oblique, parallel, very prominent on the lower, obsolete on the upper, surface; length 7 to 12 in., breadth 3·25 to 5 in.; petiole ·6 to ·9 in., scabrid-pubescent. *Panicles* axillary or terminal, 3 to 7 in. long, scurfy stellate-pubescent; flowers ·6 in. long, rather crowded on the short lateral branchlets. *Sepals* sub-equal, broadly ovate, acute, yellowish-tomentose externally, glabrous internally. *Petals* twice as long as the sepals, or longer, elliptic, oblique, obtuse, glabrous except a broad adpressed-sericeous band externally. *Stamens* 15, in bunches of three: the filaments dilated, unequal, longer than the shortly ovate anthers; apical connectival appendage deflexed, curved, longer than the anther. *Ovary* elongated-conic, minutely tomentose, tapering into the sparsely puberulous style; stigma small. *Ripe fruit* narrowly ovoid, apiculate, pale brownish-tomentose, 1·25 to 1·5 in. long and ·75 to 1 in. in diam. *Persistent sepals* nearly equal; their bases thickened, woody, pubescent, and concave, forming an irregularly 5-toothed cup which embraces the lower half of the fruit. *Shorea Hemsleyana*, King MSS. in Herb. Calc.

Penang: Curtis, No. 2512. Perak: King's Collector, Nos. 5431, 6670, and 7562. Scortechini, No. 1653.

This is an altogether anomalous species. It has leaves like several of the scabrid species of *Shorea*, such as *S. eximia* and *S. leprosula*. Its flowers are also more like those of *Shorea* than *Balanocarpus;* but its fruit is essentially that of the latter genus, in which, not without hesitation, I include it.

PLATE 193. *Balanocarpus Hemsleyanus*, King. 1, flowering branch; 2, branch with ripe fruit: *of natural size;* 3, calyx and pistil; 4, a group of stamens; 5, a petal with group of stamens at its base; 6, petal from a bud; 7, ovary, style and stigma; 8, vertical section of the same: *much enlarged.*

PACHYNOCARPUS, Hook. fil.

Nat. Ord. Dipterocarpeæ.

Resinous trees with the leaves and flowers of *Vatica*, but with sometimes only ten stamens. *Fruit* ovoid-globose, umbonate at the apex, 1-celled, 1-seeded, the pericarp densely coriaceous, splitting vertically. *Calyx* with five equal segments, at first almost free from the fruit, but the tube gradually accrescent, much thickened and adnate to the fruit, and finally embracing the whole of it except the apex. *Seed* pendulous, testa thin and adherent to the endocarp, cotyledons very thick and fleshy.

Dr. Burck (in Ann. Jard. Bot. Buitenzorg) expands the definition of the genus *Vatica* so as to include not only the closely allied *Synaptea*, but also the genera *Isauxis* W. A., *Retinodendron*, Korth., and *Pachynocarpus*, Hook. fil. To the union of *Synaptea* with *Vatica* I see no objection; for the whole difference between the two consists in perfect freedom of the fruit in *Vatica* from the enlarged calyx, whereas in *Synaptea* there is a slight adhesion to the calyx at the very base. But for the inclusion of *Pachynocarpus* I see no sufficient justification; for in this genus the calyx does not expand into membranous wings, but forms a dense fibrous cover for the fruit, which it tightly embraces, and to which it is quite adnate. As regards *Isauxis* and *Retinodendron*, they appear to me to be undistinguishable from each other by any but trivial marks; but they differ sufficiently in calyx from *Vatica* to be treated as a genus under the older name *Retinodendron*.

PLATE 194.

PACHYNOCARPUS STAPFIANUS, King in Journ. As. Soc. Bengal, for 1890, *pt.* 2, *p.* 136.

A tree 80 to 100 feet high; young branches rather stout, scaly-pubescent at first, ultimately glabrous. *Leaves* coriaceous, broadly elliptic or obovate-elliptic, the apex rounded, slightly narrowed to the rounded or subcuneate base: upper surface glabrous, shining, the lower paler, minutely and sparsely scurfy-puberulous on the midrib and nerves; main nerves 10 to 13 pairs, oblique, prominent on the lower, depressed on the upper, surface; length 5 to 8 in., breadth 2·75 to 4·5 in., petiole ·65 to 1 in. *Flowers* unknown. *Ripe fruit* almost solitary, 2·5 to 3 in. long, on a woody raceme, globular, slightly apiculate, 1·25 in. diam., closely invested by the gamosepalous, 5-toothed, thickened, woody, rugose, glaberulous calyx.

Perak: King's Collector, Nos. 5932 and 6132.

This very distinct species was first recognised as a *Pachynocarpus* by Dr. O. Stapf, of the Kew Herbarium, after whom I have named it. Its flowers are as yet unknown, but it is readily identified by its leaves.

PLATE 194. *Pachynocarpus Stapfianus*, King. Fruiting branch: *of natural size.*

PLATE 195.

ARISTOLOCHIA CURTISII, n. sp. King.

Nat. Ord. Aristolochiaceæ.

A woody climber 10 to 15 feet long; stem slender, glabrous. *Leaves* sub-coriaceous, alternate, cleft to within an inch of the base into three sub-equal lobes; the central rather longer than the two lateral lobes, oblong-oblanceolate, acuminate, 3-nerved; the two lateral subfalcate, obliquely obovate-oblong, very obtuse, 2-nerved, the venation of all three transverse; length of the side lobes 3·5 to 4·5 in., breadth at apex 1·25 to 1·5 in., the middle lobe 1 in. longer, but not so broad; petioles 2·5 in. long, slender. *Racemes* 1 or 2 from an axil, about 2 in. long, with numerous sub-horizontal amplexicaul cordate more or less rose-coloured bracts ·5 in. long. *Flowers* few, about 1·5 to 2 in. long, the perianth of a beautiful dark-blue colour, springing from the apex of the narrowly cylindric slightly clavate ovary, its lower part expanded into a narrowly ovoid tube ·5 to ·65 in. long, containing the staminal column, then constricted into a short cylindric tube, and terminated by a sub-sagittate terminal lobe about 1 in. long. *Staminal column* short, with six broad fleshy lobes beneath which are the six broad sub-orbicular 2-celled anthers. *Stigmatic* lobes 6, small, triangular, their apices projecting above the staminal column. *Ovary* longitudinally striate, about ·25 in. long. *Fruit* unknown.

Penang: King's Collector No. 1453. Curtis, No. 330.

This beautiful species appears to have been collected only once. I have dedicated it to Mr. C. Curtis, who has in recent years done so much for the exploration of the rich flora of Penang.

PLATE 195. *Aristolochia Curtisii*, King. 1, flowering branch: *of natural size;* 2, staminal column; 3, two anthers; 4, ovary: *all enlarged.*

PLATE 196.

PRAINEA, King.

Nat. Ord. Urticaceæ. Tribe Conocephaleæ.

A powerful climber. *Flowers* diœceous, closely packed in globose heads with numerous peltate scales intermixed. MALE FLOWER with tubular, obtusely 4-toothed perianth; *stamen* solitary, the anther ovate, the filament short, thick, erect; pistillode 0. FEMALE FLOWER larger than the male, the perianth tubular-clavate, thickened towards the apex, the mouth minute. *Ovary* and *style* included, free; *style* terminal, deeply 2-fid; *ovule* solitary, erect, orthotropous. *Fruit* ovoid, rather fleshy, the perianth persistent and united with the pericarp, the endocarp membranous. *Seed* exalbuminous; cotyledons fleshy, plano-convex, equal; radicle minute, straight, superior.

This genus, which was first described in Hooker's Flora of Brit. India, vol. V, p. 546, resembles *Parartocarpus* in having only a single stamen in its male flowers, but differs in having a perianth, the flowers of *Parartocarpus* having none. The erect ovule of this constitutes, however, a more important distinction, and brings it into the tribe *Conocephaleæ*, rather than into *Artocarpeæ*.

Prainea scandens, King in Hook. fil. Fl. Br. Ind. V, 546. Glabrous; the young branches thin, cylindric, sparsely lenticellate. *Leaves* alternate, petiolate, oblong-ovate or oblanceolate, shortly cuspidate, entire, cuneate at the base. Receptacles axillary, solitary, pedicellate, the male ·5 in. in diam., the female 1·5 to 2 in. in diam. *Seeds* ovoid.

Perak; King's Collector, Nos. 3549 and 3693: in dense forests at elevations of under 1,000 feet: not common.

A fine climber from 50 to 100 feet long, the main stem 12 to 15 inches in diameter. Only a few flowers on each female receptacle become fertilised and produce fruit; the abortive flowers are dry, clavate, puberulous, and persistent. Between the flowers are interspersed numerous long-pedicelled, peltate, puberulous scales. The ripe fruit measures rather more than an inch in length, the ripe seed rather more than half-an-inch.

PLATE 196. *Prainea scandens*, King. 1, branch bearing one male receptacle; 2 and 3, female receptacles (from another plant): *of natural size*; 4, single female flower opened up to show the ovary and style; 5, ovary with its bifid style; 6, the same with the arms of the style separated; 7, female flower after fertilisation; 8, vertical section of the same, showing fertilised ovary, the style arms having shrivelled; 9, ripe fruit; 10, vertical section of a ripe seed, showing the plano-convex cotyledons; 11, the flat face of a cotyledon, showing the position of the radicle (r); 12, peltate scales from the female receptacle; 13, a male flower opened up to show the 4-toothed perianth and the single stamen; 14, peltate scale from male receptacle; 15, the same seen from above. *Nos. 4 to 15 are enlarged.*

PLATE 197.

Hullettia, King.

Nat. Ord. Urticaceæ; Tribe Conocephaleæ.

Diœcious shrubs with alternate entire penni-nerved leaves with small stipules. *Flowers* 10 to 12, sunk in cavities of axillary pedunculate open funnel-shaped 3-4-lobed ebracteolate receptacles. Male flowers: *Perianths* oblong, tubular, connate with each other below and with the receptacle; the apices free, 2-lobed or 2 toothed: *stamens* 2, the anthers ovate, erect, the filaments connate in a column; pistillode 0. Female flowers: *perianth* tubular-clavate, the apex umbonate and with a small vertical opening. *Ovary* free, clavate; *style* short, central, included, stigma small: *ovule* solitary, erect, orthotropous. *Fruiting receptacle* sub-globose, on lobed fleshy receptacles enclosing 1 to 6 one-seeded fruits with membranous pericarps and the unfertilized flowers. *Seed* erect, sub-globose or flattened, exalbuminous; the cotyledons fleshy, sub-equal, plano-convex; radicle minute, straight, lying between the cotyledons near their apices.

The general affinities of this genus of *Urticaceæ*, which was first described in Hooker's Flora of British India, Vol. V, 547, are with the tribe *Artocarpeæ*, from which, however, the erect ovule excludes it. In this character, as also in its undivided style, it agrees with the *Conocephaleæ*; and, amongst the genera of that tribe, it comes nearest to *Coussapoa*.

Hullettia dumosa, King in Hook. fil. Fl. Br. Ind. V, 547. Glabrous, the young branches pubescent. *Leaves* elongated-obovate or oblong, shortly cuspidate, the base narrowed, 6 to 12 in. long and 2·5 to 3·5 broad; the petioles stout, ·5 to 1 in. long. *Stipules* ovate, acute. *Receptacles* of male flowers ·25 in. in diam., those of the female flowers sub-globose or sub-pyriform, 1 to 2 in. in diam., all with short stout peduncles.

Perak: King's Collector No. 3959; Scortechini, without number.

Another species of this genus (*H. Griffithiana*, King) occurs in Tenasserim. It was first collected by Helfer and is his No. 4676—1 (Kew Distribution). The specimen just quoted was described by Kurz under the name *Dorstenia Griffithii* (Flora of Burma, II 462). But it does not agree with the characters of that genus. Excellent specimens of Helfer's plant have recently been collected near Mergui in Tenasserim by Mr. R. L. Proudlock, Curator of the Botanic Garden, Calcutta.

Plate 197. *Hullettia dumosa*, King. 1, branch bearing a mature female receptacle; 2, male receptacle, *seen from outside* (from another specimen); 3, immature female receptacle; 4 and 5, the same cut obliquely; 6, transverse slice of a female receptacle, showing the arrangement of the perianths and ovaries; 7, vertical section of a mature sub-globose receptacle containing only one seed; 8, vertical section of a mature lobed receptacle containing several seeds; 9, a seed; 10, vertical section of a seed, showing the plano-convex cotyledons and the minute superior radicle (r): *all of natural size;* 11, female flower, showing the tubular perianth cut open and the clavate ovary; 12, vertical section of a male receptacle, showing the anthers of three flowers; 13 and 14, male flowers with one side of the perianth cut away; 15, 16, and 17, the diantherous column of the male flower, seen from different points: *all enlarged.*

PLATES 198 AND 199.

Hemiorchis Pantlingii, King n. sp.,

Nat. Ord. Scitamineae.

Herbaceous; rhizome 12 to 18 in. long, branching, sparsely clothed with short fibres. *Leafy stem* distinct from the flowering one and produced after it, 15 to 20 in. long; *leaves* ovate-lanceolate, tapering to each end, sheathing at the base, 6 to 14 in. long and

2 to 4·5 in. broad. *Flowering stem* stout, 4 to 8 in. long, leafless, but with 4 to 6 blunt spathaceous bracts. *Flowers* spicate. *Calyx* tubular, pubescent, membranous, with three short subequal sub-acute lobes shorter than the corolla-tube. *Corolla* in two whorls of 3 each; the outer whorl pinkish, with a dorsal ovate segment and two lateral shorter and narrower segments, all subacute; inner whorl yellowish, shorter than the outer, the two lateral segments broad, obovate, emarginate, the middle lobe rhomboidal, concave with a central thick ridge from base to apex; at the base a transverse recurved process, and at the sides of the base two purple divergent fleshy processes (staminodes). *Fertile stamen* incurved, shorter than the inner whorl of the corolla; the filament thick and fleshy; anther broadly elliptic, emarginate at base and apex, 2-celled, with longitudinal lateral dehiscence. *Ovary* inferior, obliquely and narrowly ellipsoid, striate, 1-celled; placentas 3, parietal; style filiform, lying in a groove on the face of the filament and between the anther-cells; *stigma* projecting slightly above the apex of the anther, minute, cup-shaped. *Capsule* fusiform, 1·25 in long, 8- to 10- ribbed, pubescent, crowned by the withered segments of the perianth. *Seeds* broadly ovoid, ·25 in. long, with a short white fleshy arillus.

Sikkim Himalaya; growing in sand by the sides of streams from 800 to 3,500 feet. R. Pantling.

This interesting genus was founded by Kurz in the Journal of the Asiatic Society of Bengal in the volume for 1873, pt. 2, p. 108, t. VIII. Kurz regarded the perianth as consisting of a tubular calyx in a single whorl, and of a corolla in two whorls. But he did not observe (at least he did not describe) the two staminodes at the base of the odd lobe of the inner whorl of the corolla which complete the symmetry of the staminal whorl. As a fact these staminodes do not appear to be well developed in the only species which he knew, viz. *H. Burmanica*. In the plant now figured and described, these are most distinct; and I venture to think that their existence invalidates the theory of the flower under which the lateral lobes of the inner whorl of the corolla are in this genus regarded as staminodes.

Plate 198. *Hemiorchis Pantlingii*, King. 1, rhizome, showing the relation of the bud of the leafy-stem to the old flowering stem; 2 outline of one of the largest leaves: *of natural size*; 3 & 4, leafy-stem: *reduced in size.*

Plate 199. *Hemiorchis Pantlingii*, King. 5, rhizome and flowering scape: *of natural size*; 6, front view of flower; 7, side view of flower; 8, stamen, and middle lobe of inner whorl of corolla with the staminodes at its base; 9, base of middle lobe cut off at its junction with the tube; 10, part of ovary, tube of corolla and fertile stamen; 11, fertile anther with stigmas projecting from its apex; 12, ripe fruit; 13, a seed; 14, section of the same: *all enlarged.*

PLATE 200.

Milula, *nov. gen.* Prain.

Nat. Ord. Liliaceae.

Tribus xii. Allieae (*definitione parum ampliata*—bracteae 1—∞, flores rarissime spicati).

Subtribus 1.* *Miluleae.* (Sub-trib. nova proxima *Euallieis* anteponenda). *Bulbus tunicatus; spica in scapo simplici aphyllo terminalis. Bractea membranacea subspica* 1, *bracteolae* 0; *perianthium gamophyllum; androecium regulare. Capsula loculicide dehiscens.*

Milula gen. nov. Prain in Sc. Mem. Med. Off. Army India. Part IX, t. 1. *Bulbus* tunicatus; *folia* liguliformia; *inflorescentia* spicata, bractea solitaria membranacea obtecta; *perianthium* gamophyllum 6-partitum, lobis rotundatis; *stamina* breviter epiphylla 6, petalis opposita; *ovarium* syncarpium 3-loculare, stylo simplice filiformi, ovula in loculis singulis 2; capsula loculicide dehiscens, seminibus 2—3; *testa* corrugata et minutissime punctulata.

"MILULA SPICATA Prain, l. c. *Herba* bulbo elongato dimidio inferiore squamis (foliorum
" veterum reliquiis) fibrosis vestito radicibus numerosis; *foliis* lineari-lanceolatis scapum
" fistulosum bulbo duplo longiorem aequantibus excedentibusue; *spica* cylindrica bractea
" basali spathacea ovato-acuminata inclusa, floribus viridi-rubescentibus parvulis plurimis
" campanulatis, segmentis perianthii aequalibus margine undulato-fimbriatis; staminibus
" in seriebus duabus exterioribus 3 carpellis alternantibus filamentis dimidio inferiore
" expansis petaloideis, interioribus 3 carpellis oppositis paullo brevioribus filamentis
" prorsus filiformibus, antheribus versatilibus omnibus perfectis; *ovario* subgloboso ovulis
" ad angulum loculi interiorem parum supra basin affixis; *capsula* globosa ovulis in
" loculo quoque semper 1 nonnunquam ambobus abortis; seminibus nigris.

" In HIMALAYA ORIENTALI: Chumbi, apud Do-tho, *Kingii mercenar.* !

"Bulbus 'prasinus' 4—7 cm. longus; squamæ fibrosæ 2½—3½ cm.; radices
" 4—5 cm.; folia viridia 10—15 cm. longa, hæc ⅓—½ cm. lata; scapus viridis liber
" 6—9 cm. longus, ¼—⅓ cm. crassus; spica 2—5 cm. longa, 1 cm. diam.; bractea 3 cm.
" longa hæc 2 cm. lata; flosculi 2½ mm. lati perianthio 3½ mm. filamentis 4—5 mm.
" longis; ovarium 1½ mm. diam. stylo 2 mm. longo stigmate minimo; capsula 3 mm.
" lata tenuis; semina 2½ mm. longa 1½ mm. diam."

"This plant is one of the most interesting which the botanical investigation of the Eastern Himalaya, conducted during the past twenty years on behalf of the Government of Bengal by the Superintendent of the Royal Botanic Garden, Calcutta, has revealed to science. It was obtained by one of the native collectors of that garden in Chumbi, the valley which lies immediately to the east of Sikkim. Politically, this valley is Tibetan; geographically, it forms part of the Himalayan region, since the stream that drains it finds its way southwards through Bhutan and Assam to the Brahmaputra. Its Flora, however, indicates that, though so near to Sikkim, it enjoys a comparatively dry climate. This is due to the fact that, in place of lying open, as does the basin of the Tista (which practically constitutes Sikkim) to the moisture-laden currents that sweep up from the sea of Bengal to precipitate on the Sikkim Himalaya the heavy rainfall which characterises this area, the Chumbi Valley has a narrow southern outlet, and the lofty ridges which enclose it practically deprive these currents of their moisture ere they reach the depression beyond.

" The facies of this singular plant, which bears out to some extent the comparative dryness of its habitat, is so completely that of an *Allium* that at first sight one feels inclined, in spite of its spicate inflorescence and its solitary bract, to treat it as the type of a somewhat aberrant section in that comprehensive genus. Both characters, repugnant though they be to our generic conception of *Allium*, might be looked upon as incidental. Already *Allium* includes species with heads of sessile florets, while in some other genera the passage from a head to a spike is of the simplest;* the difference, moreover, between one bract and two, among plants like the *Allieæ*, where the bracteal variation is admittedly $2-\infty$, is no more than arithmetical. But when we find these characters associated with such apparently essential ones as a distinctly gamophyllous perianth and a decidedly 2-seriate androecium, it becomes at least inadvisable to further expand the limits of a genus already so unwieldy as *Allium*. A secondary reason for excluding the plant from *Allium* is that the specimens show no trace of the garlic odour so characteristic, even in dried examples, of most if not of all the species of that genus.

" The localisation of the genus does not appear to be difficult; an overwhelming majority of characters indicate its tribal position to be among the *Allieæ*, (tribe XII of *Liliaceæ* in Bentham and Hooker's *Genera Plantarum*). It its true that none of the *Allieæ* hitherto described have a spicate inflorescence or a solitary bract. But it must be remembered that both characters may be merely incidental; the main point is that, like the other *Allieae*, the plant under review *is* bracteate under the inflorescence. The *Scilleæ*, with which it agrees in the single character of a spicate inflorescence, and whose facies it does not recall, have no involving bract. The secondary question of the subordinate position of the genus presents a little difficulty. Of the already recognised subtribes it clearly approaches most nearly the *Euallieæ;* and, if it must be located in a known subgroup, it is among these that it can with the least amount of dislocation be placed. The question really turns on the relative value, for purposes of classification, of characters derived from the inflorescence and from the individual florets. Already the *Euallieæ* include plants with a gamophyllous perianth and plants with 2-seriate filaments, so that the characters on which the generic rank of *Milula* largely depends favour the localisation of the genus in that subtribe. At the same time it must be recollected that, whether incidental or not, the characters of a spicate inflorescence and of a solitary bract are not shared by any other member of the *Allieae*, and it seems more natural as well as more convenient to treat *Milula* as typical of a new subtribe to be inserted among the *Allieæ* immediately before the *Euallieae*." *D. Prain in Scientific Memoirs by the Medical Officers of the Army of India Part 9, 1895.*

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* The genus *Acacia*, for example, amongst the *Leguminosæ*; *cfr.* Prain in Journal of the *Bombay Natl. Histy.* Society, V, 165 (1890).

Plate 200. ***Milula spicata***, Prain.

1. Section of stem × $\frac{1}{1}$.
2. Flower × $\frac{3}{1}$.
3. Perianth laid open to show staminal insertion × $\frac{3}{1}$.
4. Stamen of outer series, from within and also sideways × $\frac{3}{1}$.
5. Stamen of inner series, from within and also sideways × $\frac{3}{1}$.
6. Ovary × $\frac{5}{1}$.
7. Vertical section of ovary showing an ovule × $\frac{5}{1}$.
8. Floral diagram, vertical.
9. Floral diagram, horizontal.
10. Ripe fruit, cut across × $\frac{5}{1}$.
11. Ripe fruit, seeds fallen, showing dehiscence × $\frac{5}{1}$.
12. Diagram showing dehiscence and position of seeds and of abortive ovules.
13. Seed × $\frac{5}{1}$.
14. Vertical section of seed showing embryo × $\frac{5}{1}$.

Figs. 1—9 are taken from flowers belonging to the specimen delineated; figs. 10—14 from fruits of a second specimen collected at the same time and place.

The specimen selected is the only one of the solitary gathering which shows two scapes; the others have put one.

H. P. & E. J. H.—Reg. No. 2863J—260—24-4-96.

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W. M. D'C.—Reg. No. 2898J of 1893-94—260—3.6.96.

ANNALS

of the

ROYAL BOTANIC GARDEN, CALCUTTA.

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PART I.—Palæomorphe and Urostigma.

„ II.—Synœcia, Sycidium, Covellia, Eusyce and Neomorphe.

APPENDIX—

1. Some New Species of Ficus from New Guinea, by G. King.
2. On the Phenomena of Fertilization in Ficus Roxburghii, Wall., by D. D. Cunningham, M.B., F.R.S., C.I.E.

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„ II.—PLATES—Stelechocarpus to Anaxagorea.

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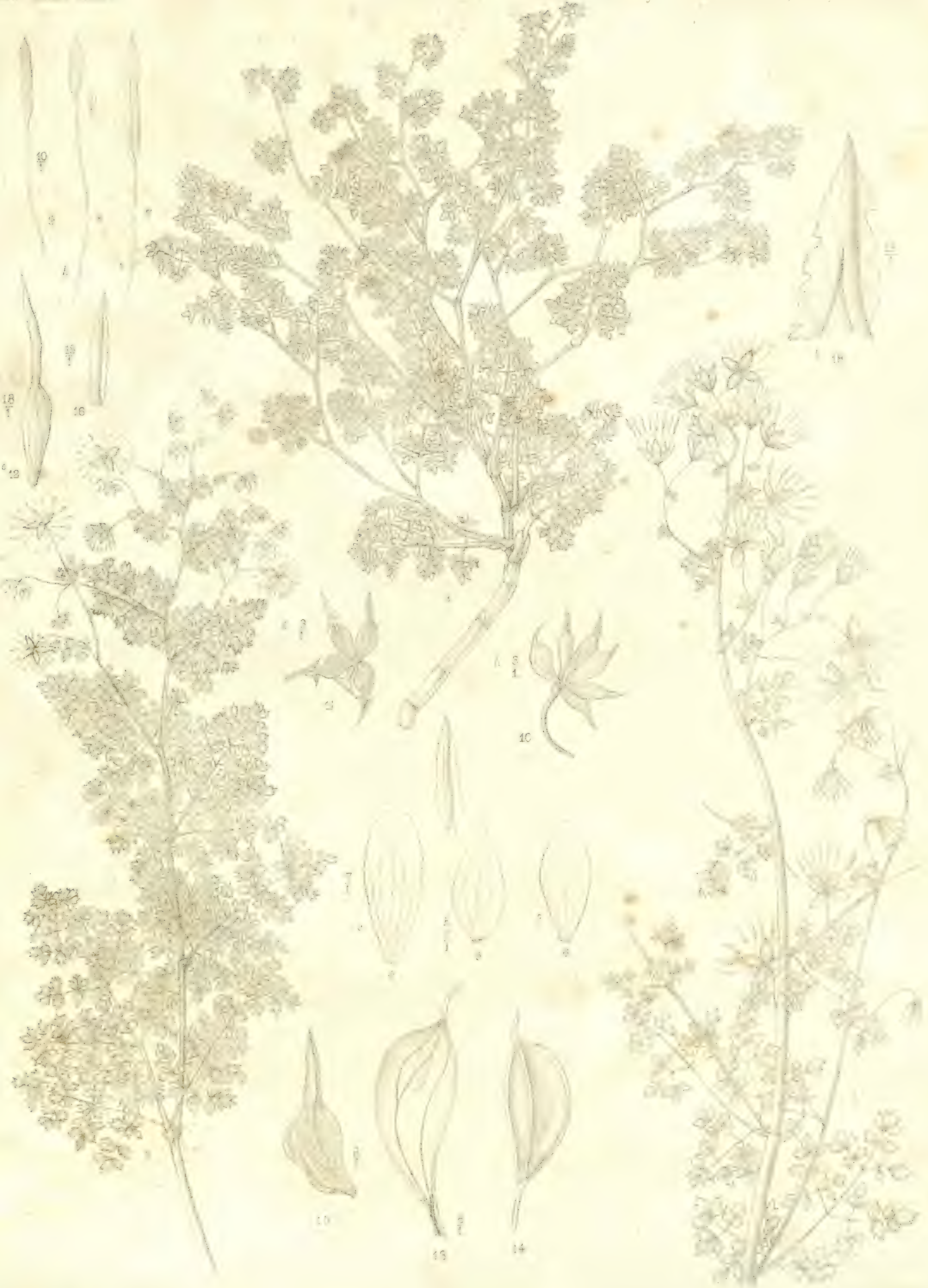
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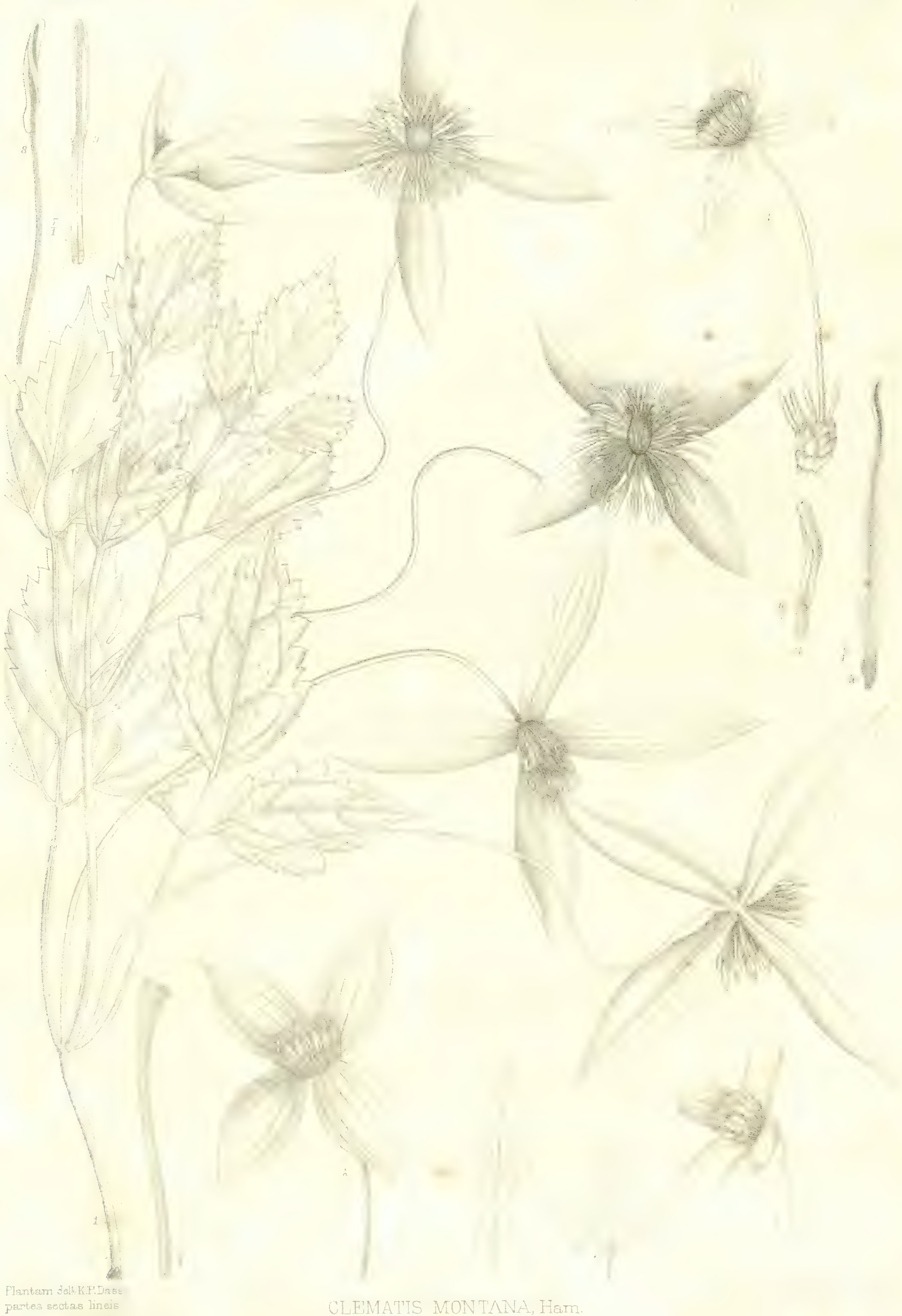
Plantam. delt A. L. Singh.
partes sectas lineis.
descripsit P. Brühl.

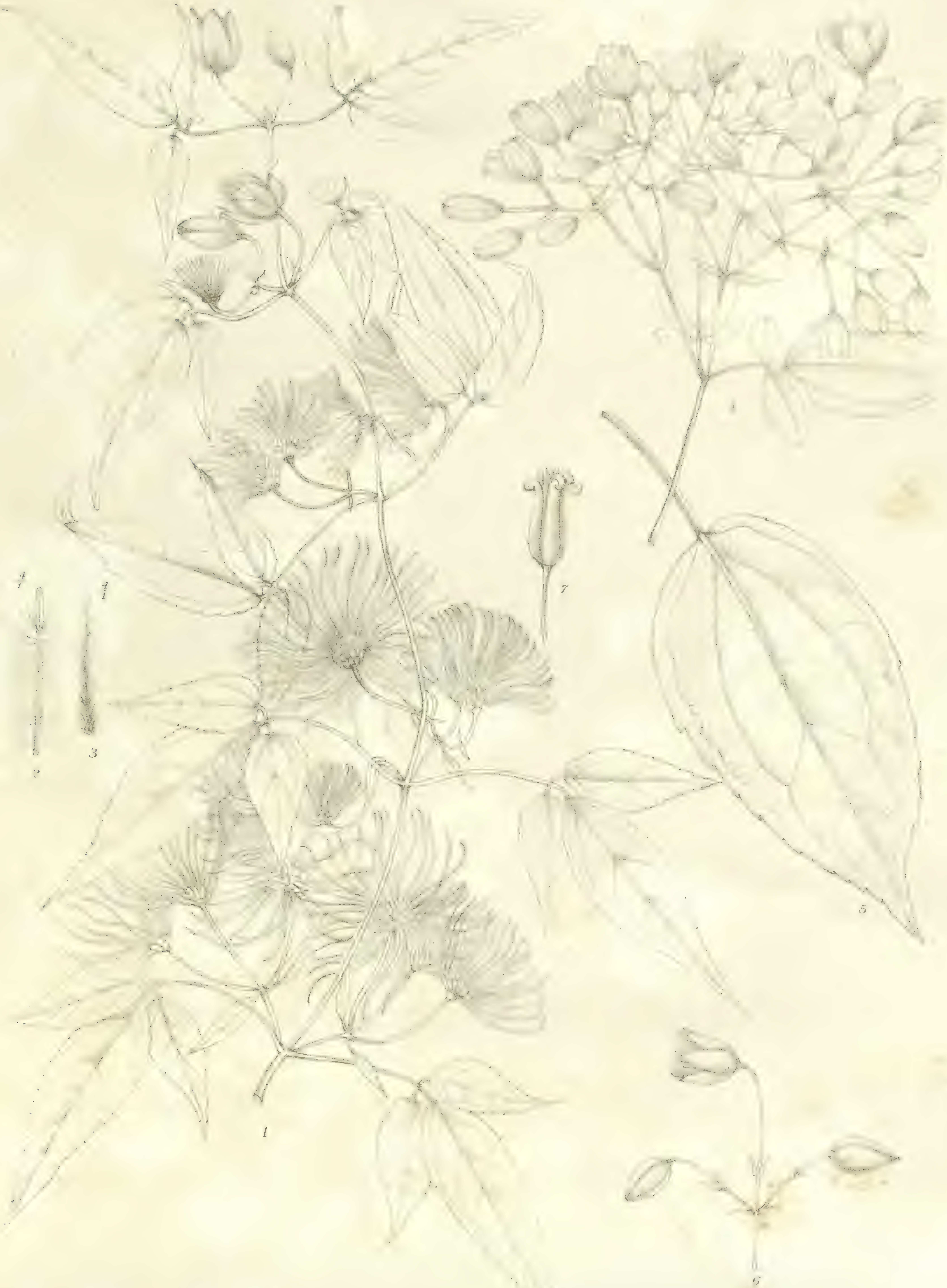
THALICTRUM CULTRATUM, Wall.
SUBSPECIES I. II. et. III.

Lith. by K.H. Das.



Plantam del. K.P. Dass
partes sectas lineis
descripsit P. Brühl

CLEMATIS MONTANA, Ham.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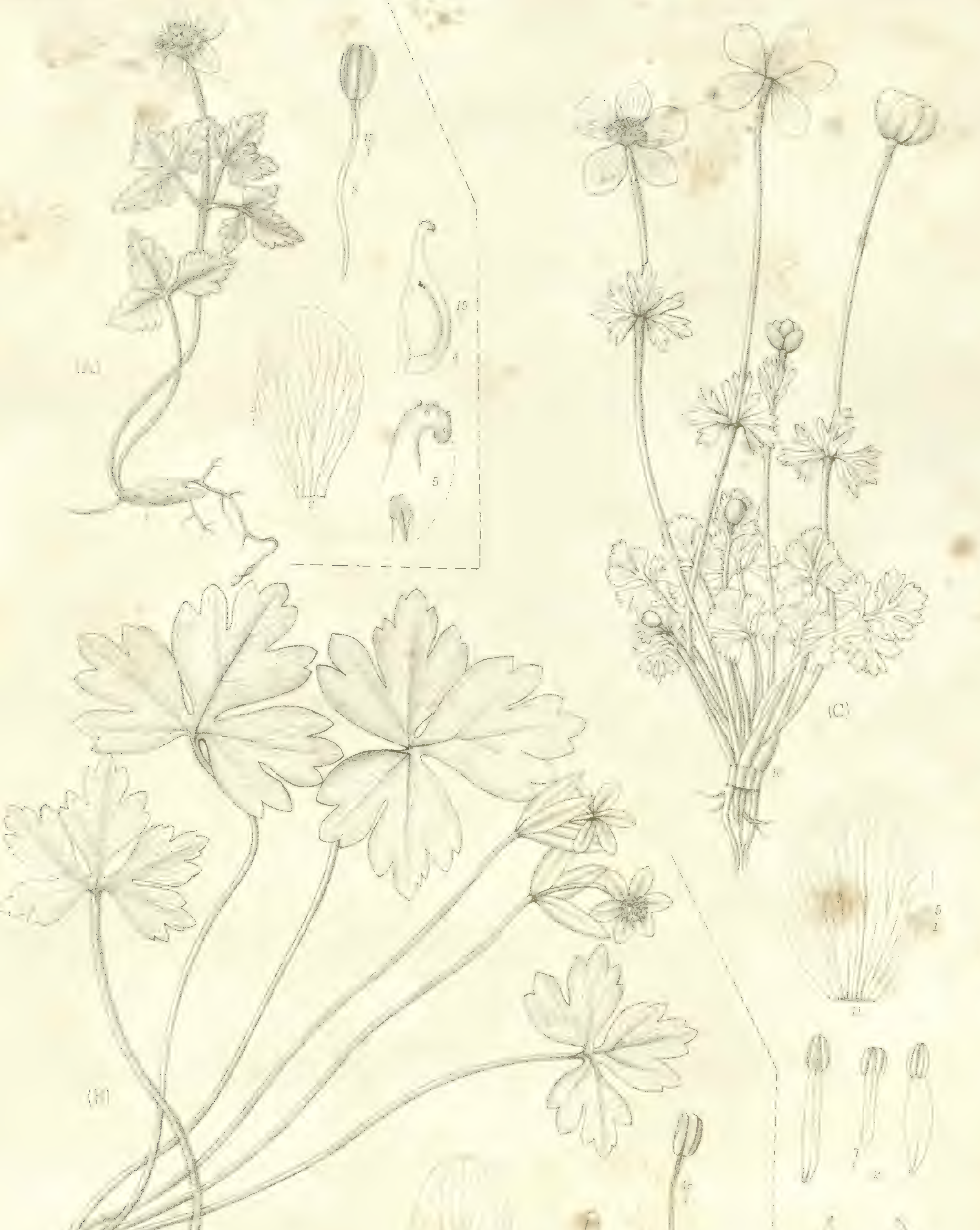
CLEMATIS ACUMINATA, DC.

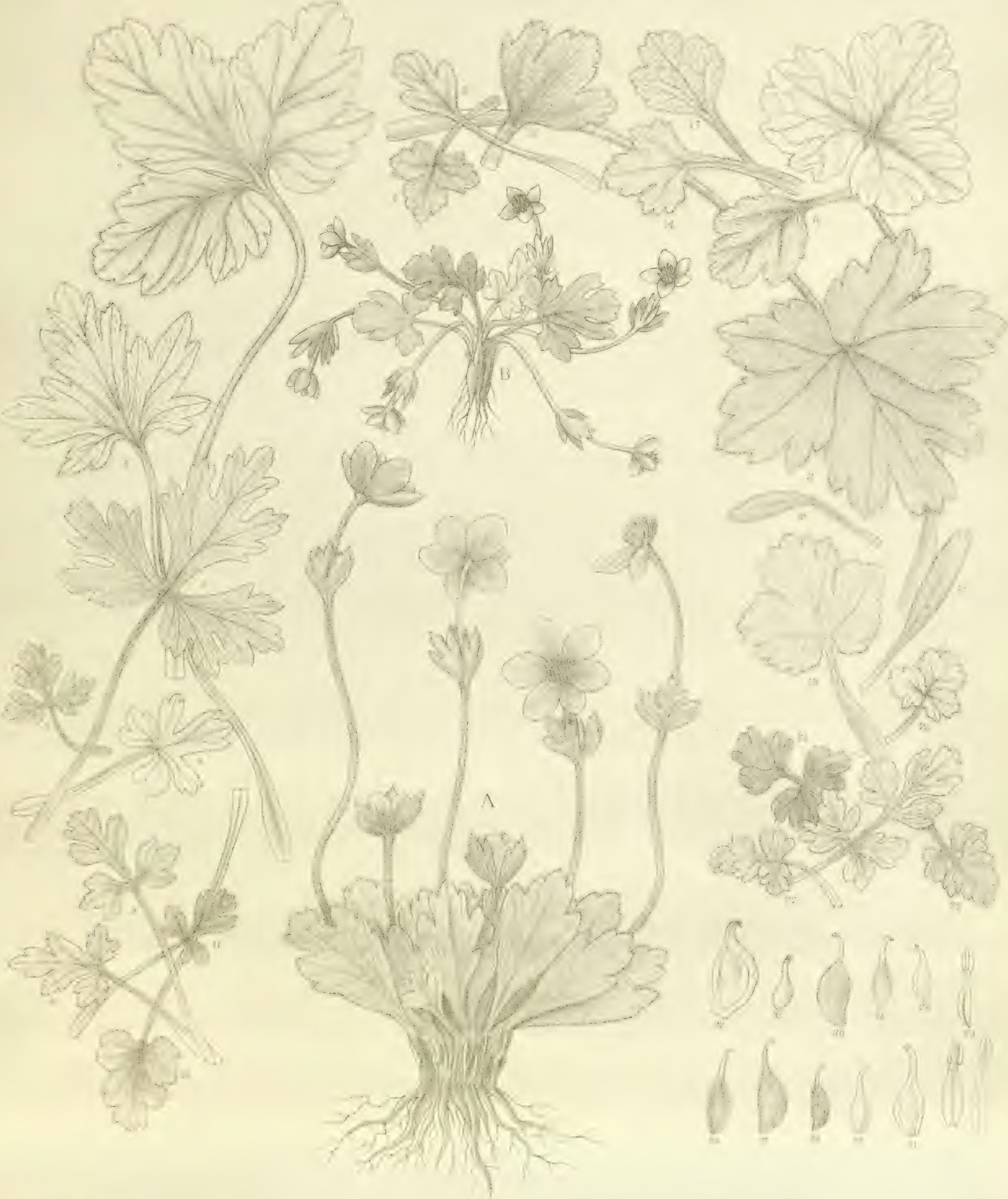
Lith. by Chitra Silpi Co.



Plantas delt. D. A. Chowdhary;
partes sectas lineis
descripsit P. Brühl.

(A) ANEMONE GRIFFITHII, H. f. et T.
(B) A. FALCONERI, T. (C) A. RUPESTRIS, Wall.

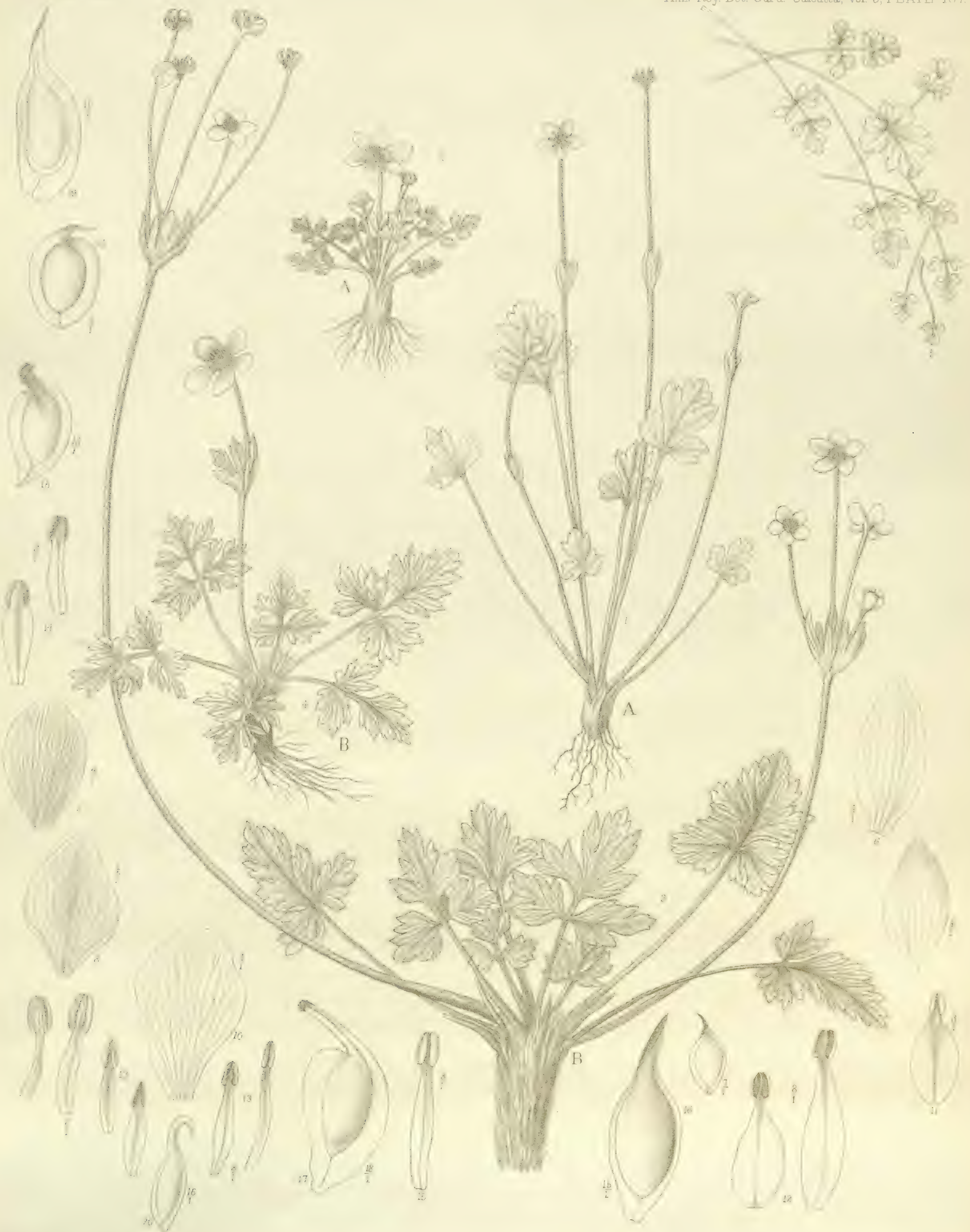
Lith. by A. C. Mukerjee



[illegible] J. Pruhl

Lith. by A. C. Mukerjei

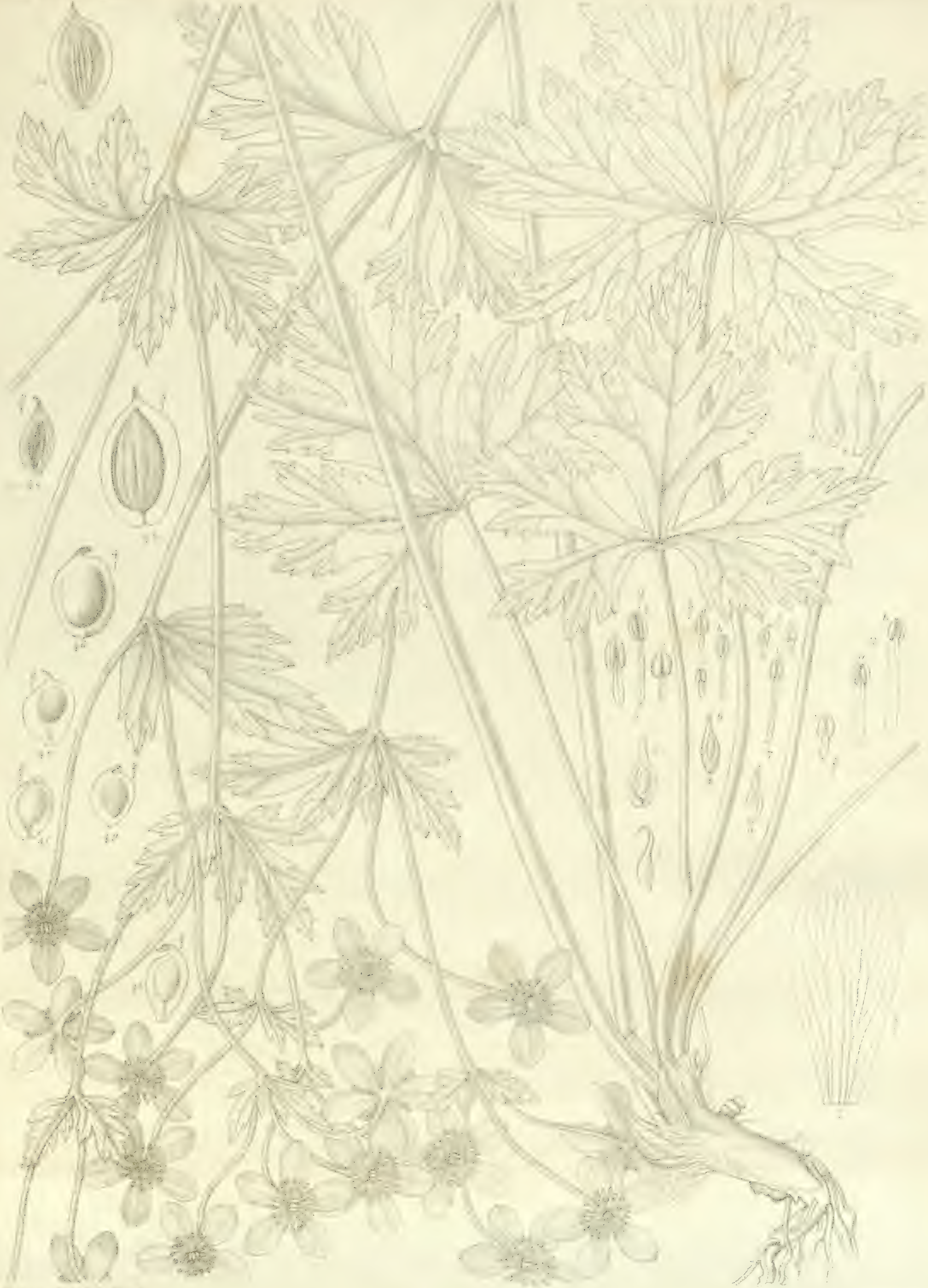
ANEMONE OBTUSILOBA, Don.
(A) SUBSP. TRULLIFOLIA, (Hf. et T.)
(B) SUBSP. OVALIFOLIA, P. B.



Stirpes et partes sectas lineis descripsit P. Brühl.

Lith. by A. C. Mukerjei.

(A) ANEMONE RUPESTRIS, Wall in Herb. Calc.
(B) ANEMONE DEMISSA, H. f. et T.



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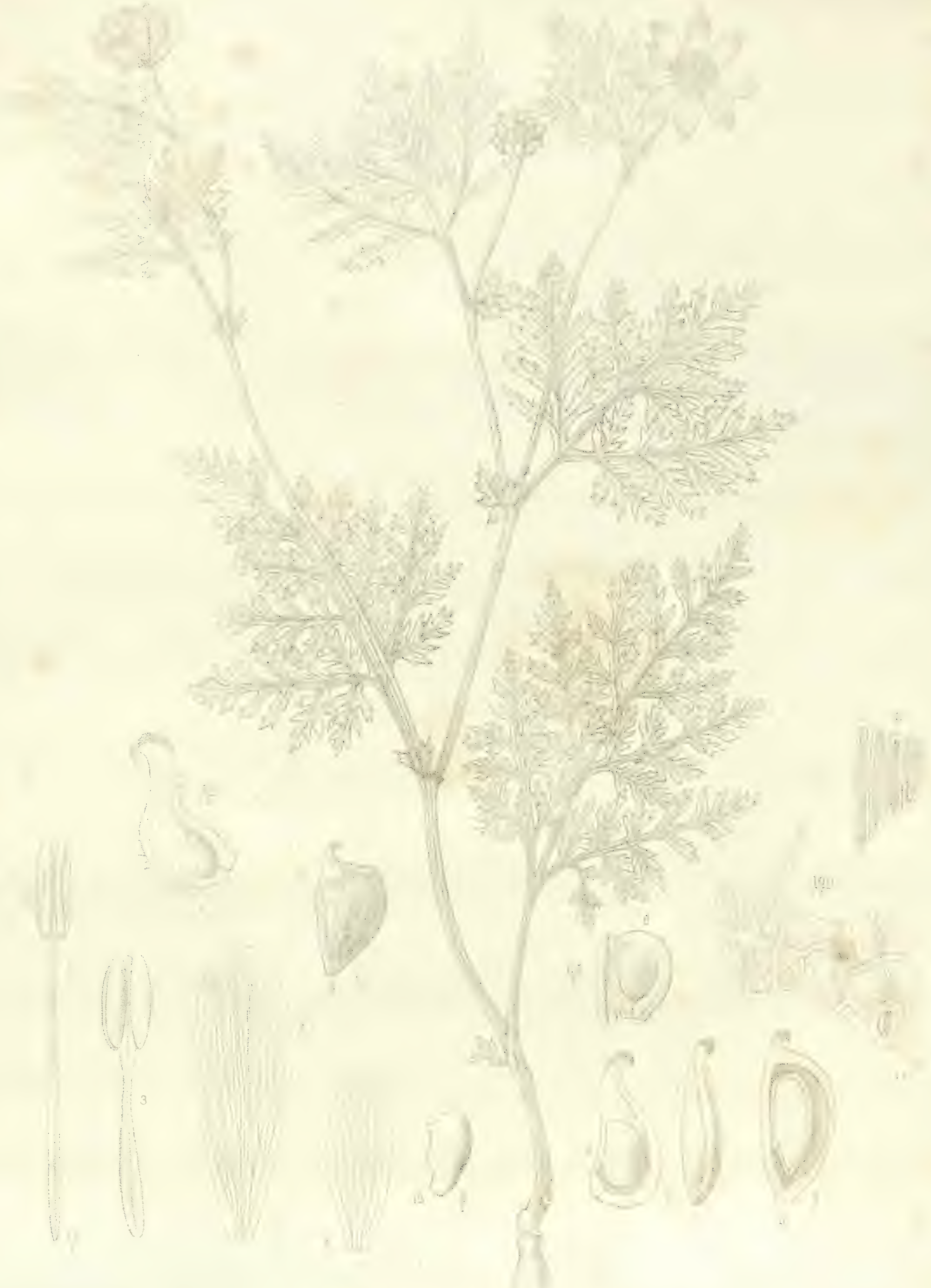
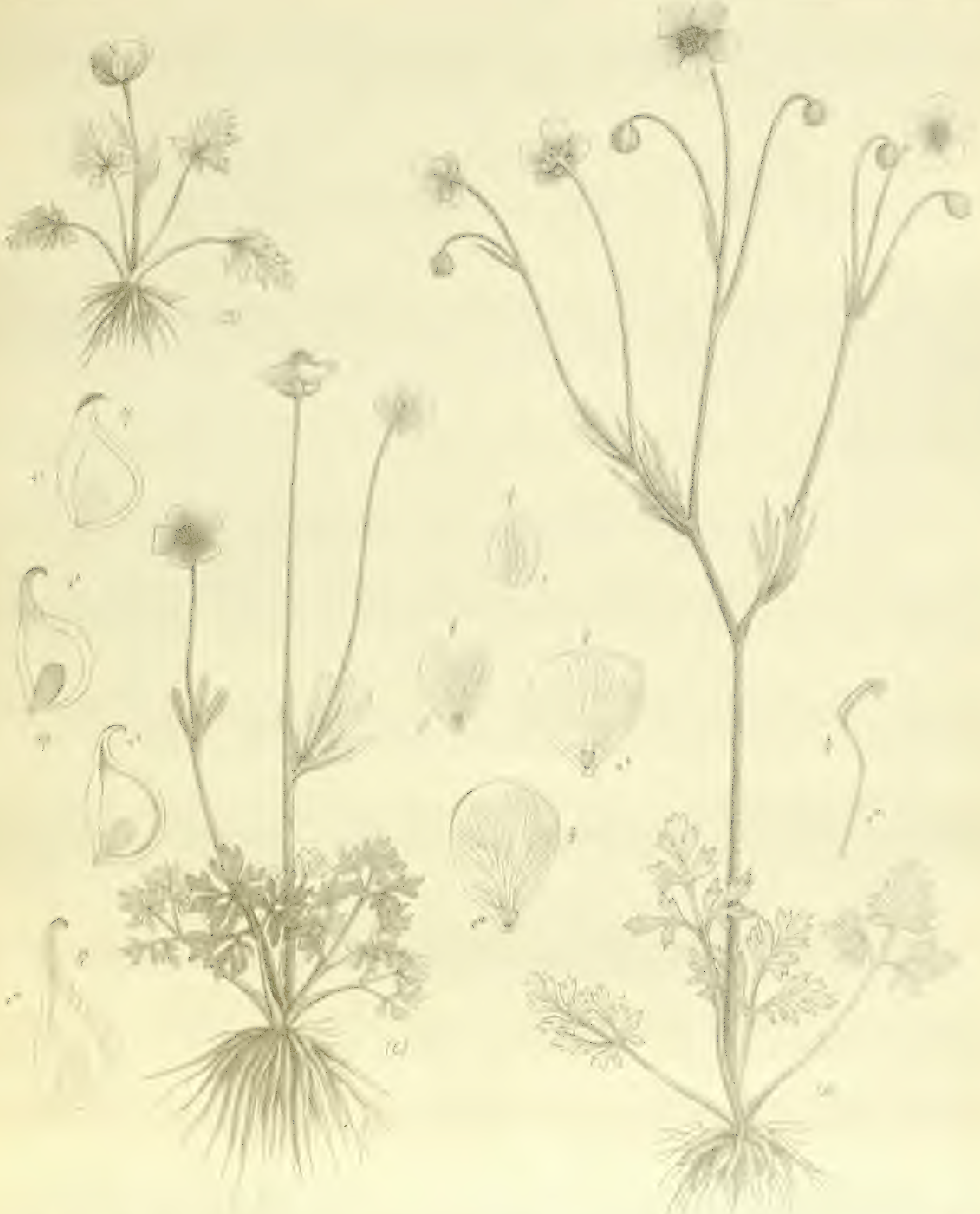
Lith. by A. C. Mukerjei.

ANEMONE ELONGATA, Don.



Stirpem del^t A. L. Singh.
partes sectas lineis descripsit P. Brühl.

ADONIS BREVISTYLA, Franch.
var. trichocarpa. P.B.



[illegible]pes atque partes sectas
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RANUNCULUS AUCHERI, Boissier.
(A) subsp. typica, var. persica; (B) var sikaramensis, P.B;
(C) subsp. hariabensis, P. B.

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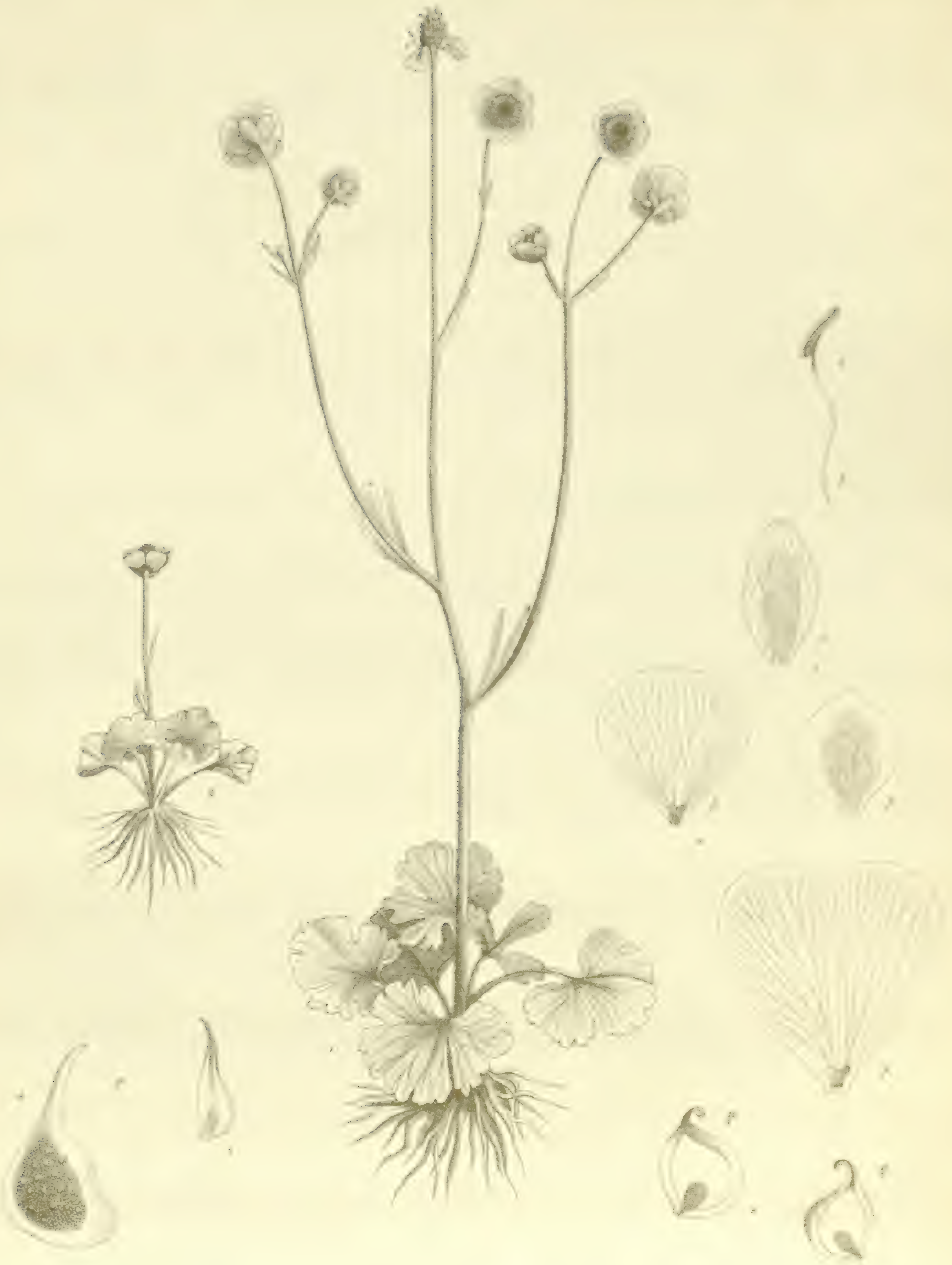
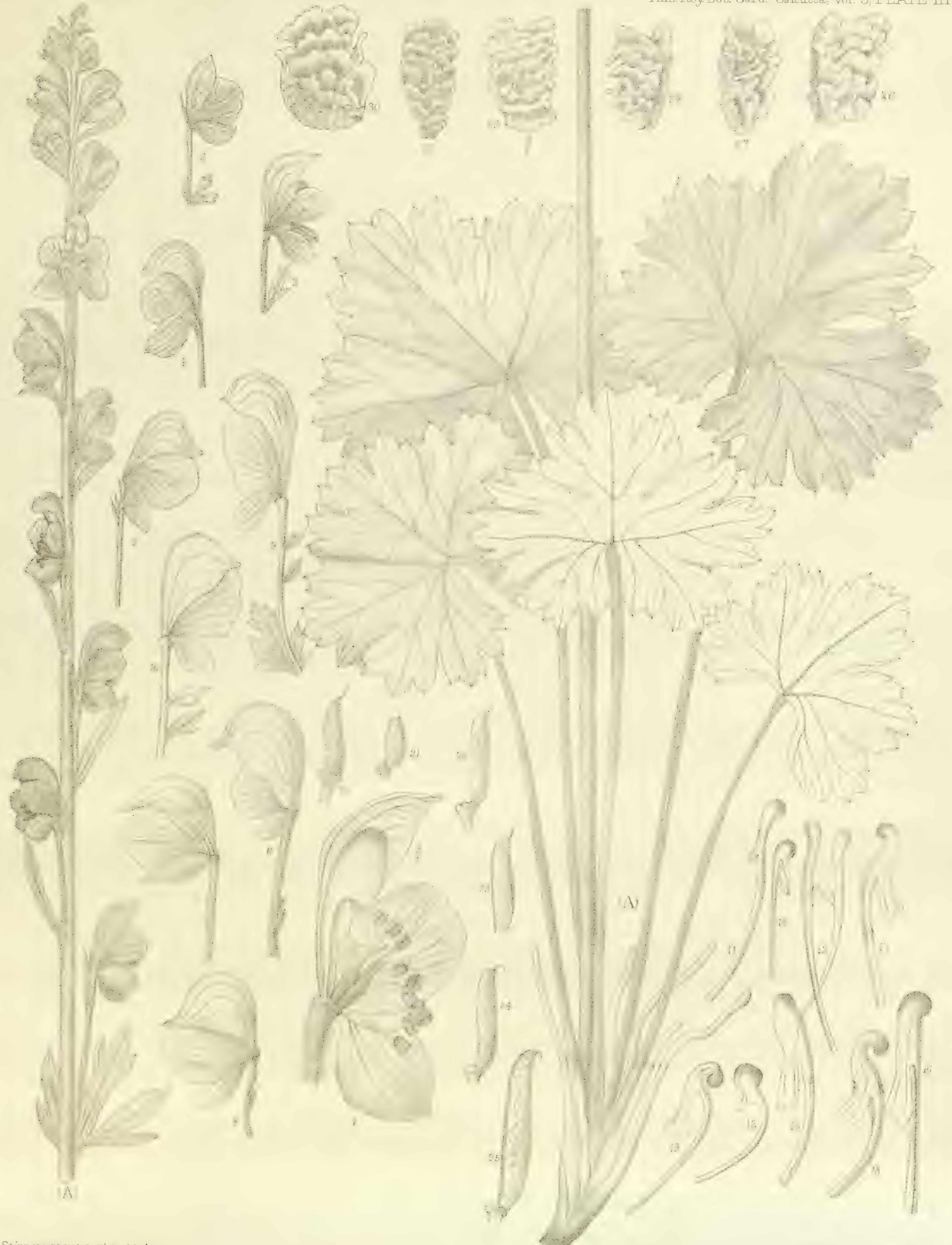


Stirpes atque partes sectas
lineis descr. Paul Brühl.

RANUNCULUS AFGHANICUS,
Aitch. et Hemsl.

Lith. by Chuna Lall & Co.



Stirpem atque partes sectas
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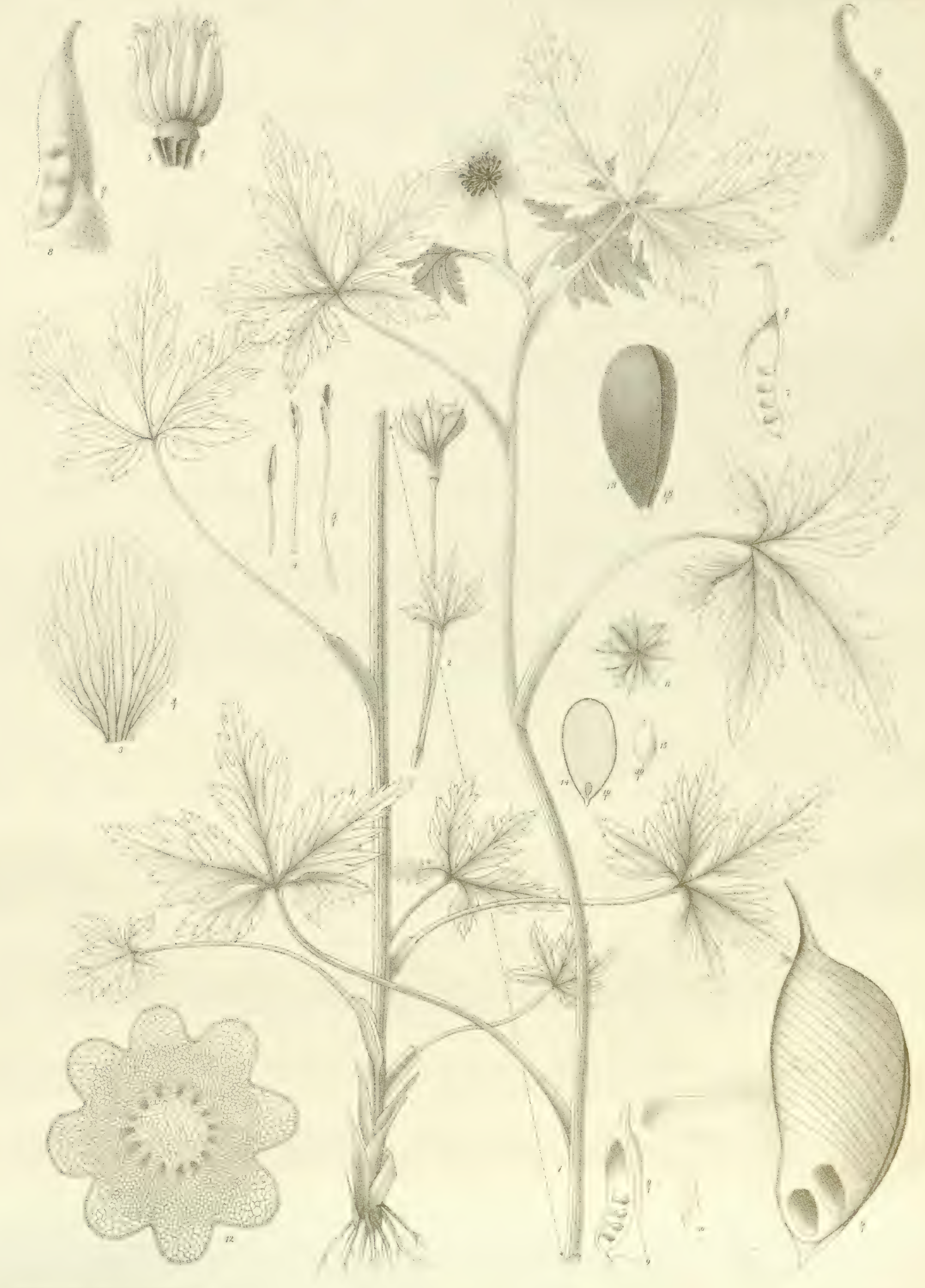
Lith. by A. C. Mukerjei.

ACONITUM FEROX, Wall.;
(A) Subsp. MOSCHATUM, P. Brühl.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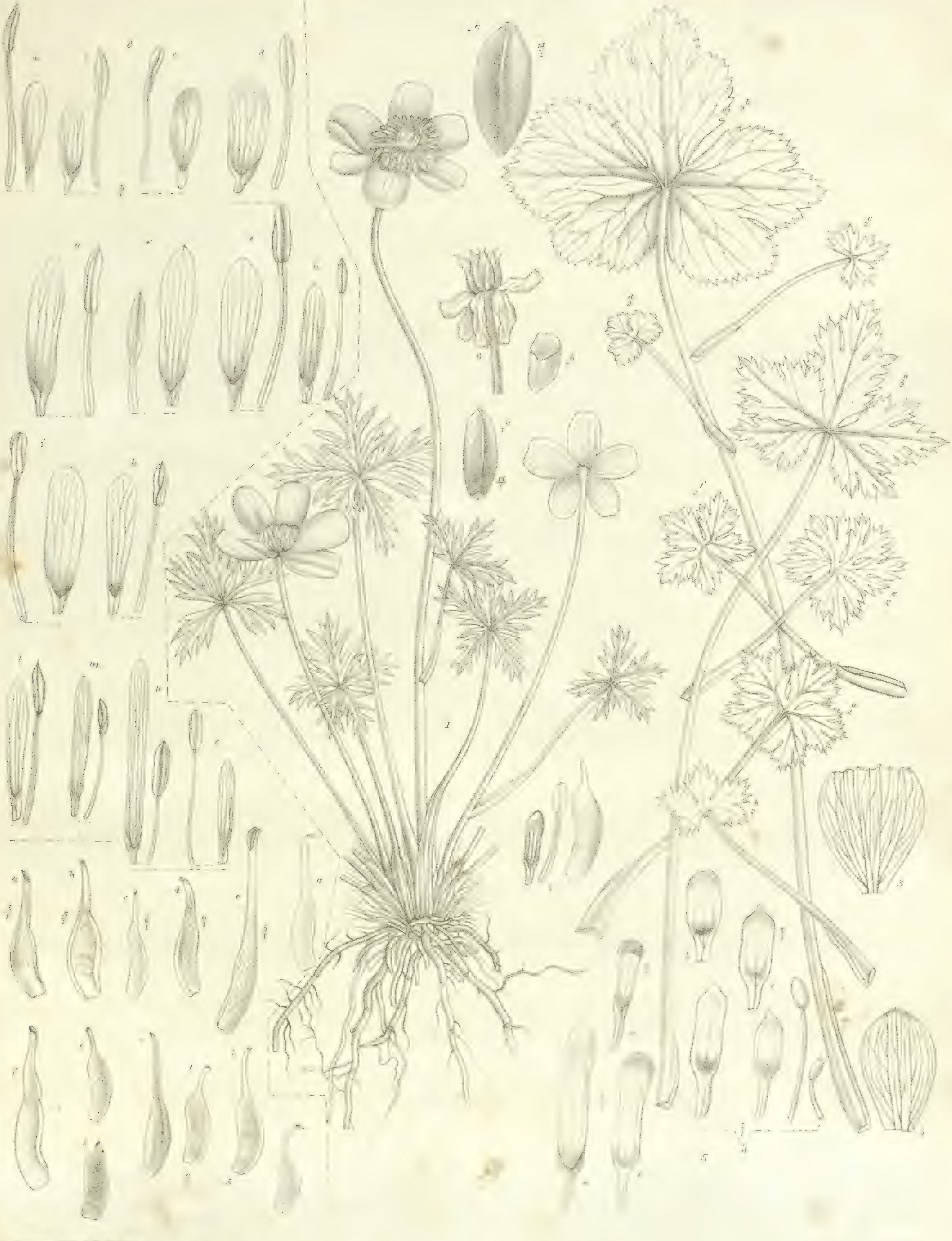
Stirpem et partes sectas
lineis descripsit P. Brühl.

CALATHODES PALMATA, H.f. et T.

Lith by S. C. Mondul.



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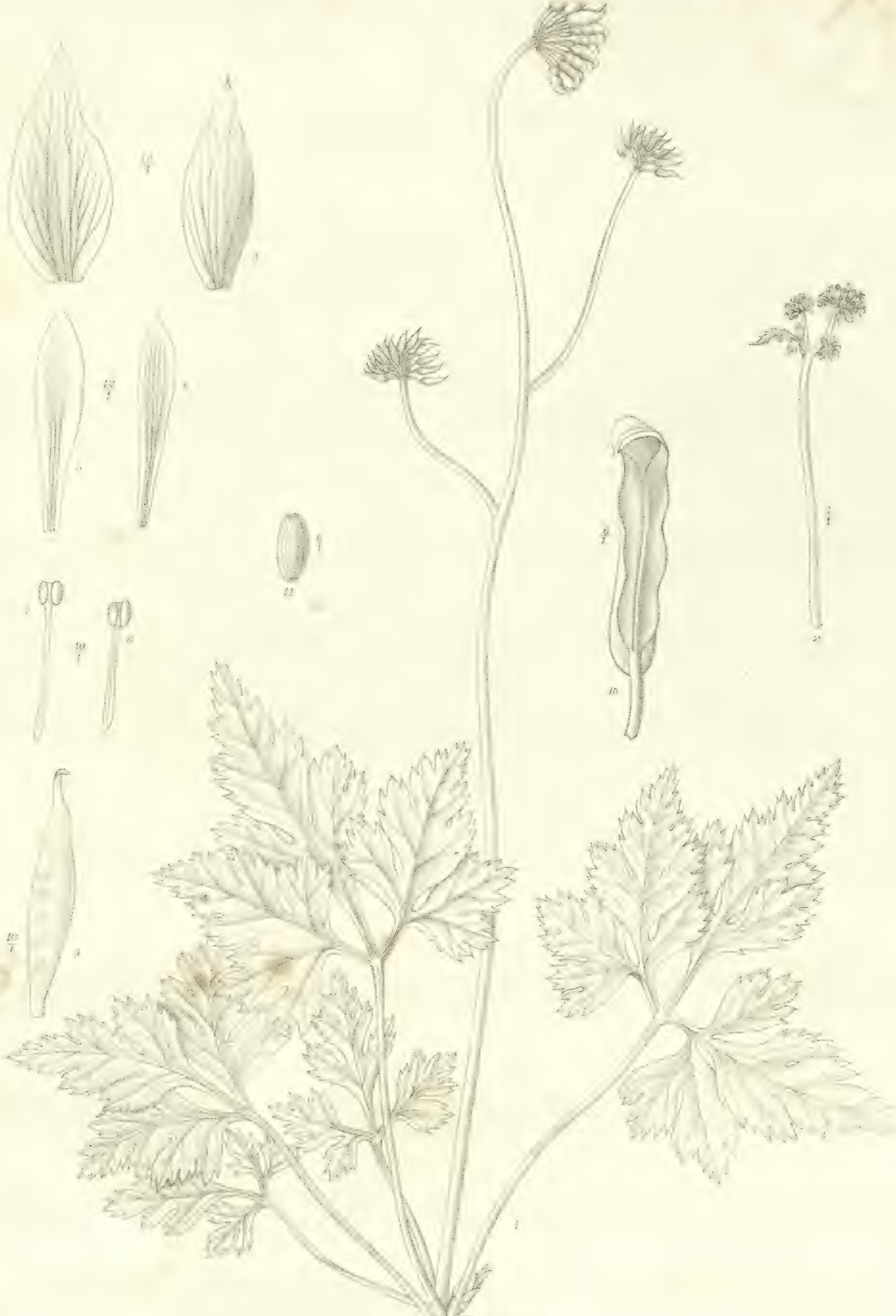
partes sectas ipse;
descripsit P. Brühl.

TROLLIUS PUMILUS, Don.

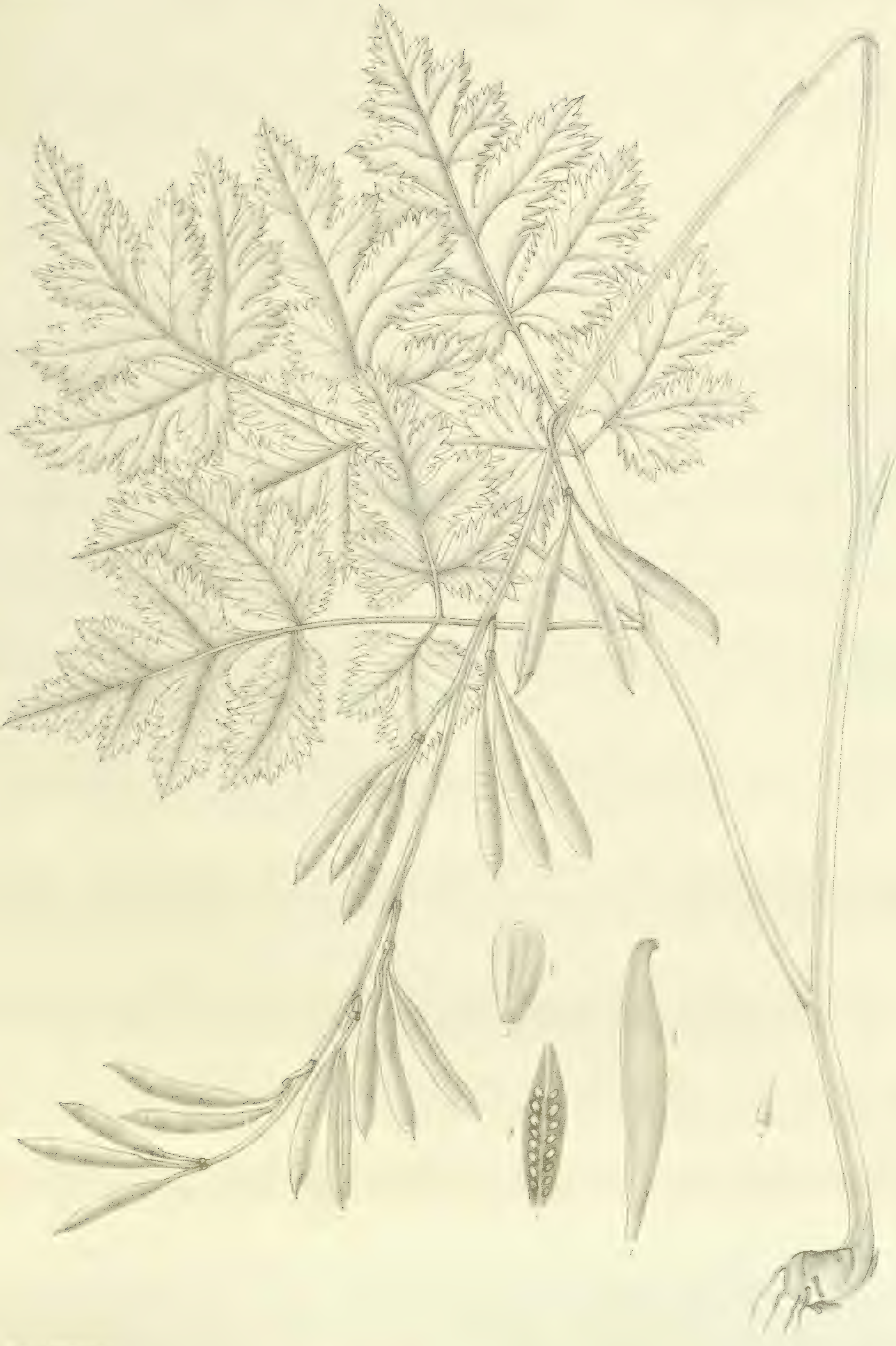
Lith. by A.C. Singha.



Stirpem delt. A. L. Singh;
partes sectas lineis
descripsit P. Brühl.

COPTIS TEETA, Wall.

Lith: by A. C. Singha.



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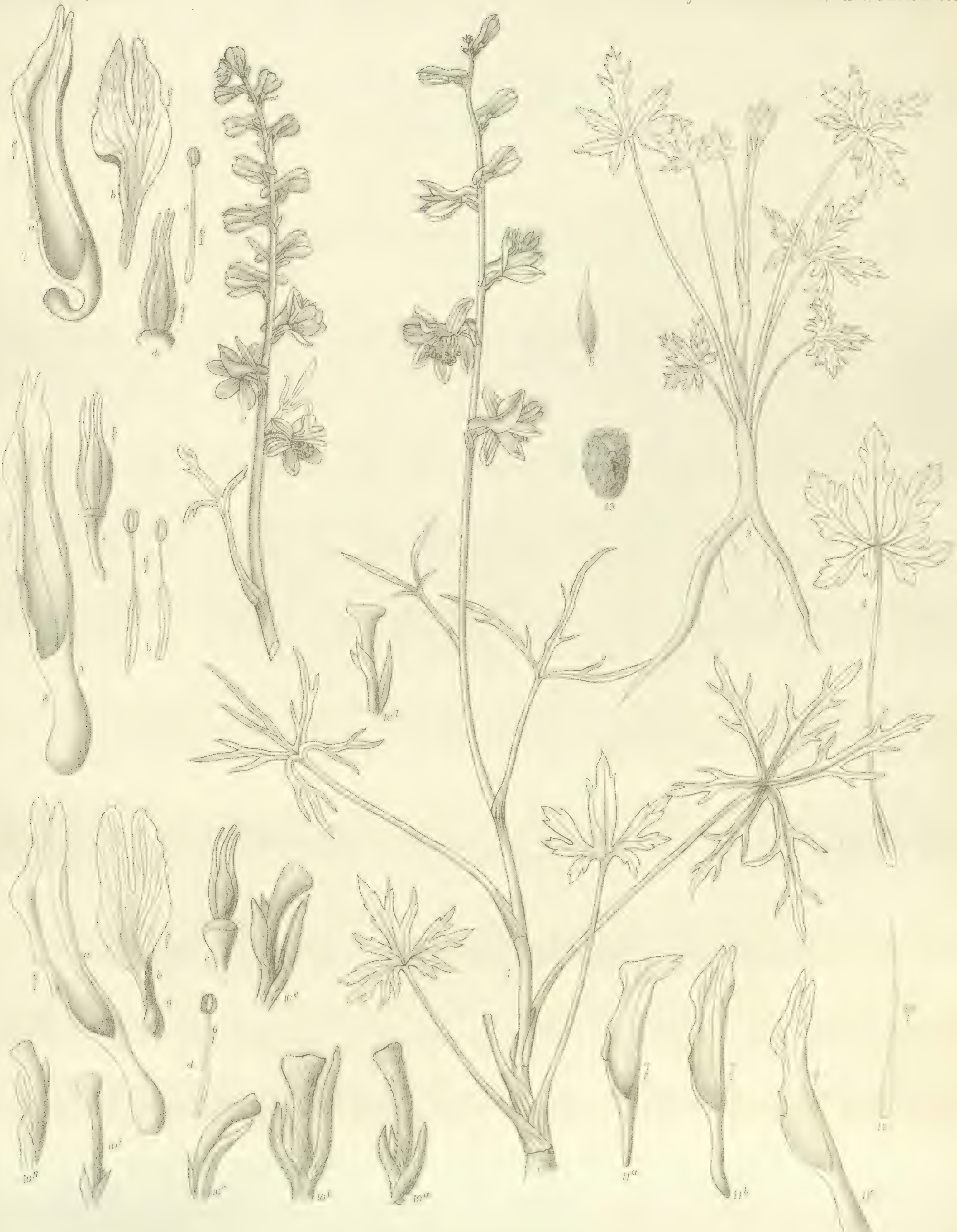
COPTIS OSPRIOCARPA, P.B.

Lith. by A. C. Singha.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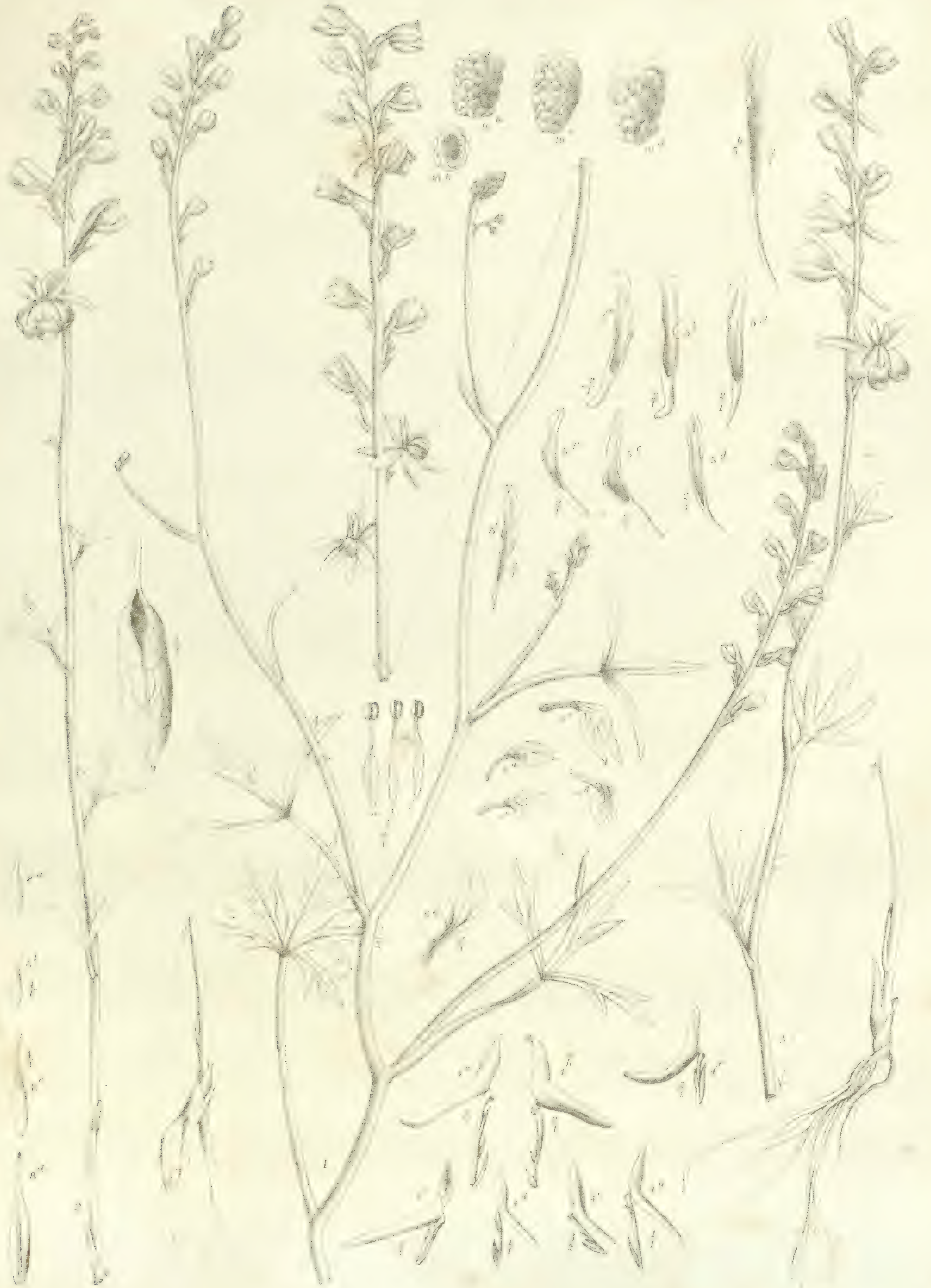
Stirpem delt A Mollais
reliquas partes areis
descripsit P Brühl.

Lith. by A C. Mukerjee

DELPHINIUM UNCINATUM, H.f. et T.



Stirpes. delt. K.P. Dass;
partes sectas lineis
descripsit P. Brühl.

DELPHINIUM SANICULAEFOLIUM, Boiss.

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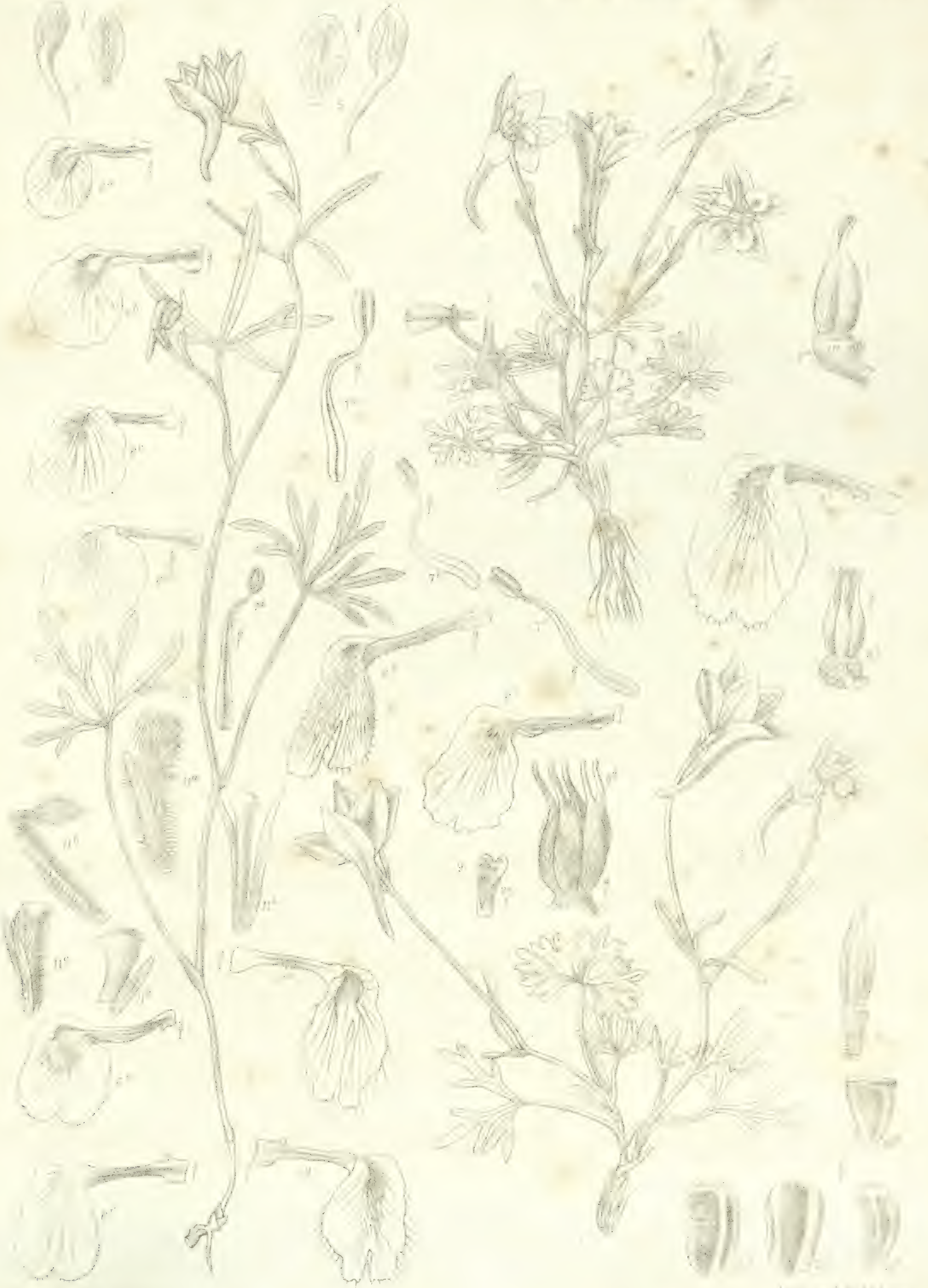
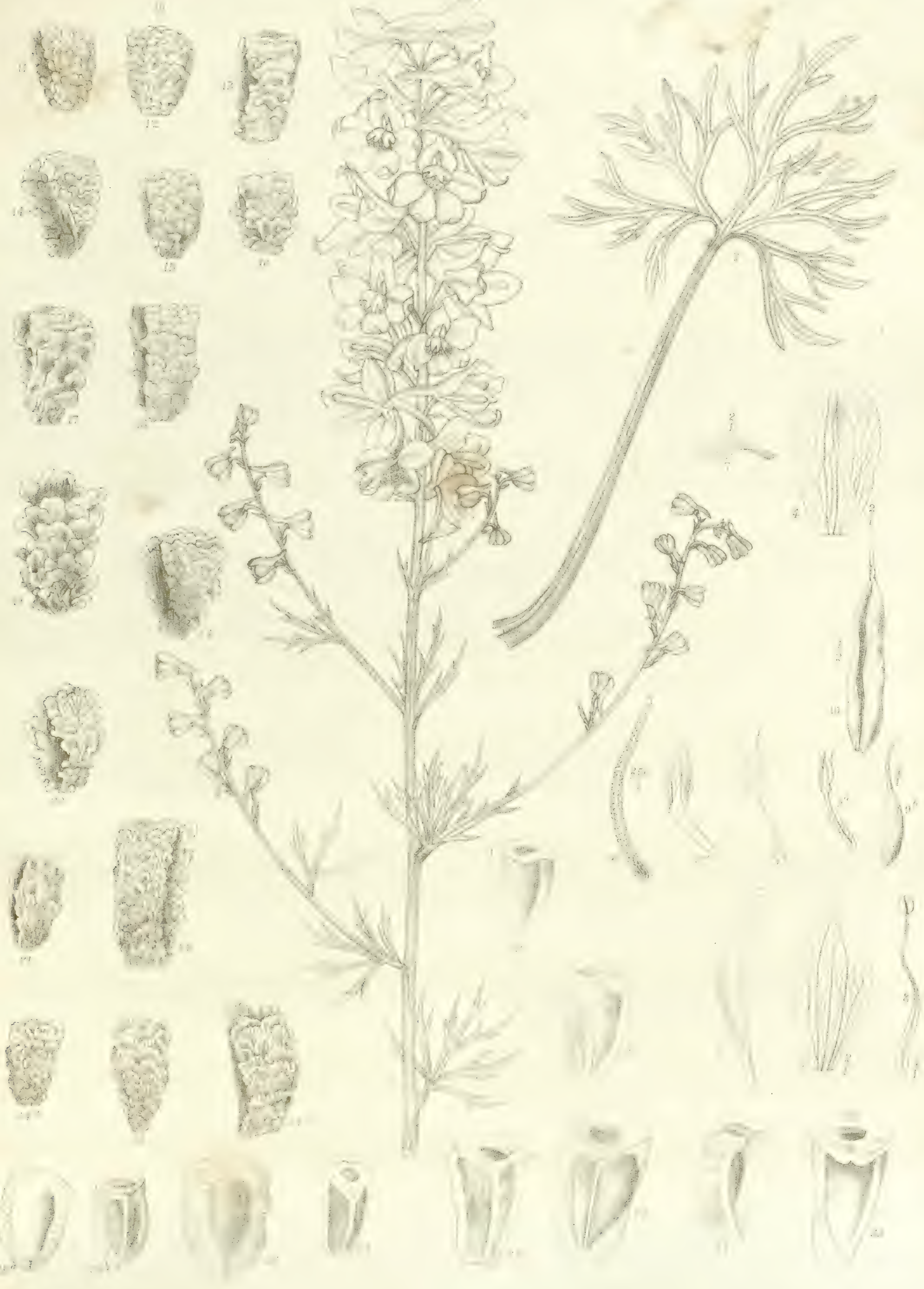


Stirpes delt. A. Molla;
partes sectas lineis
descripsit P. Brühl.

DELPHINIUM GRANDIFLORUM, Lin.

Lith. by A. C. Mukerjee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Stirpes del. G. C. Dass.
partes sectas [illegible]
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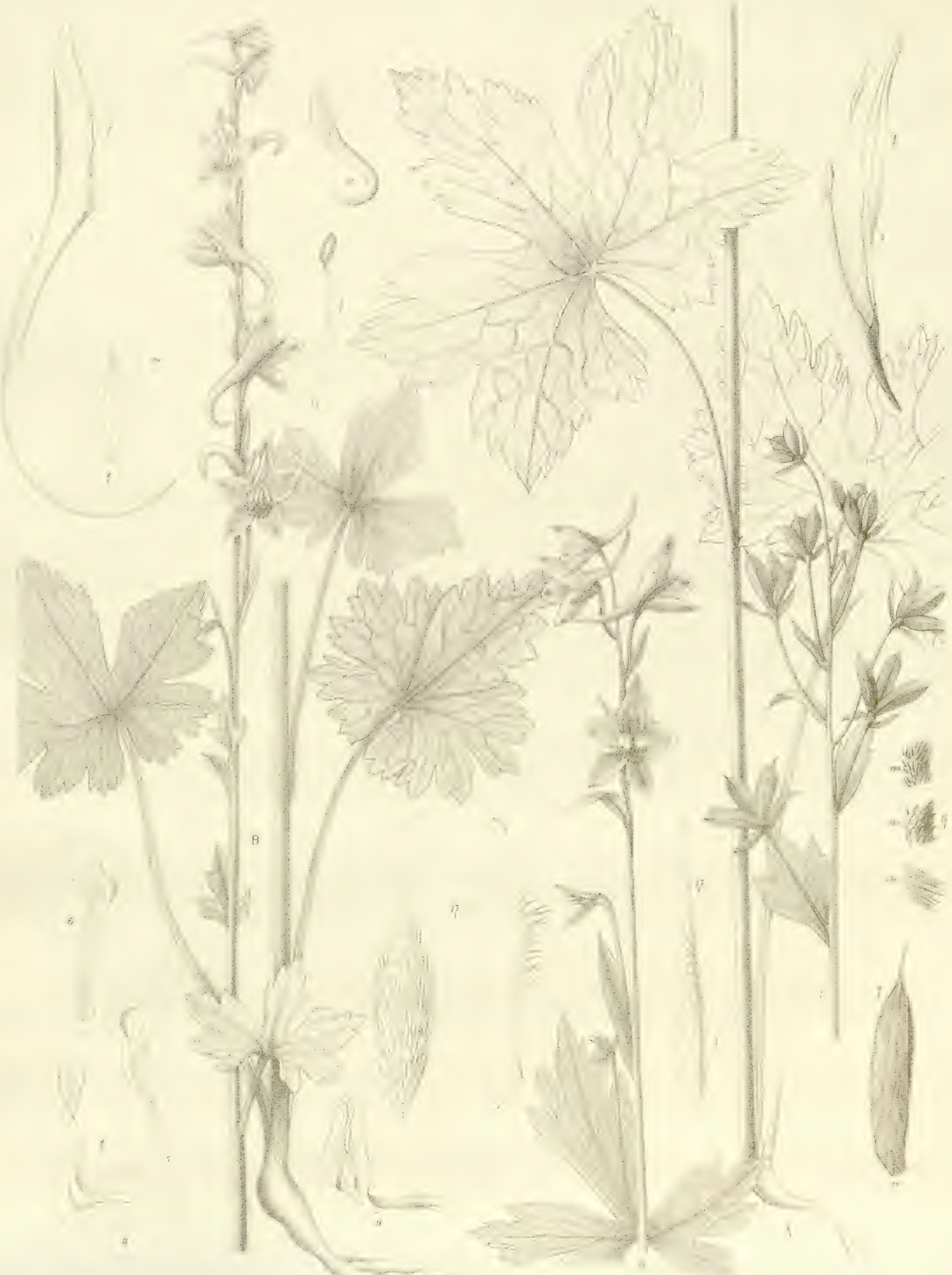
DELPHINIUM INCANUM, Royle.
SEMINA DELPHINIORUM INDICORUM.

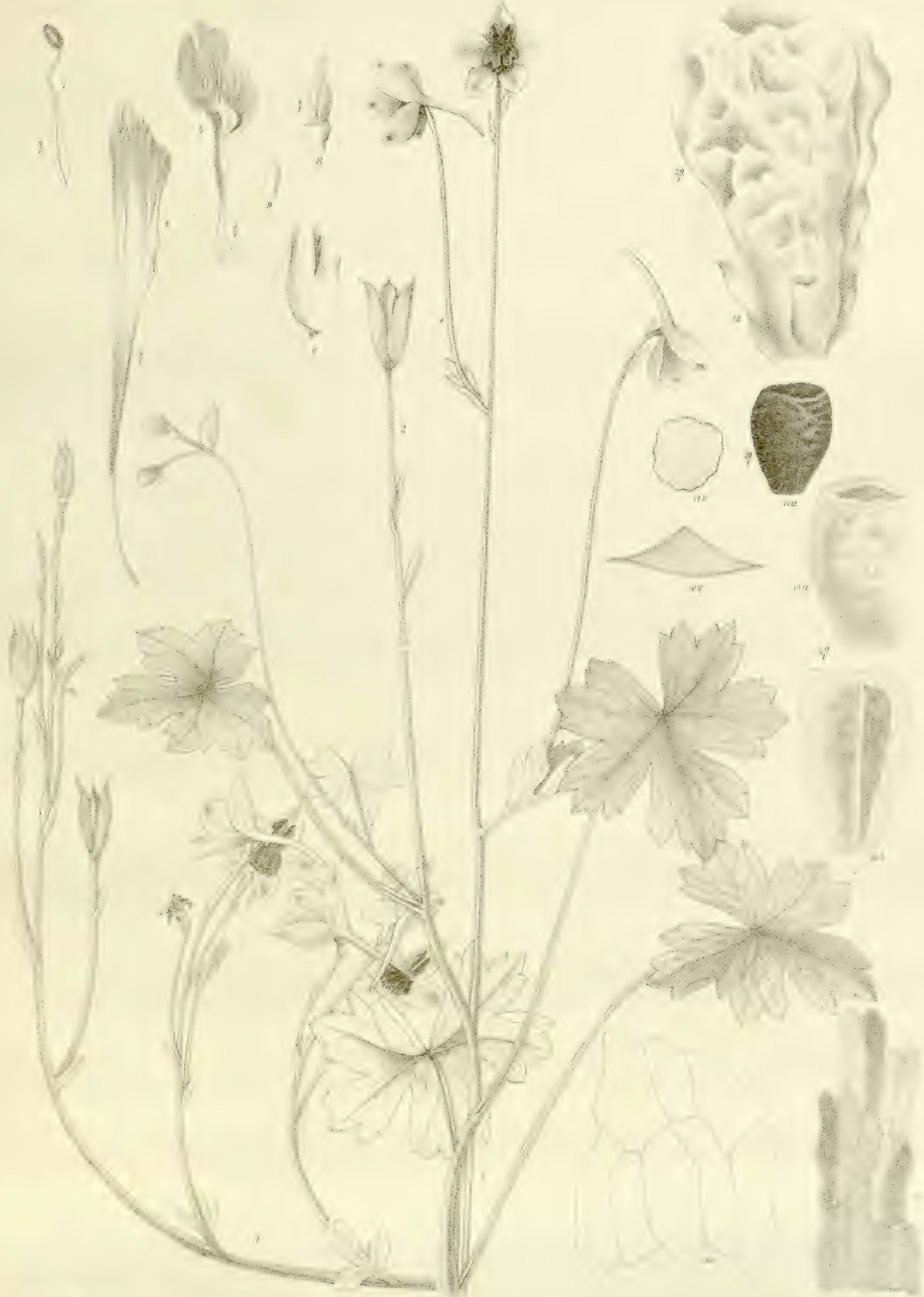
Lith. by A. C. Mukerjee.



Stirpes ac partes sectas
lineis descripsit P. Brühl.

Lith. by A.C.Chowdhary.

DELPHINIUM ALTISSIMUM, Wall.
(**A**) subsp. typicum, var. phallutense, P. B.
(**B**) subsp. drepanocentrum P. B.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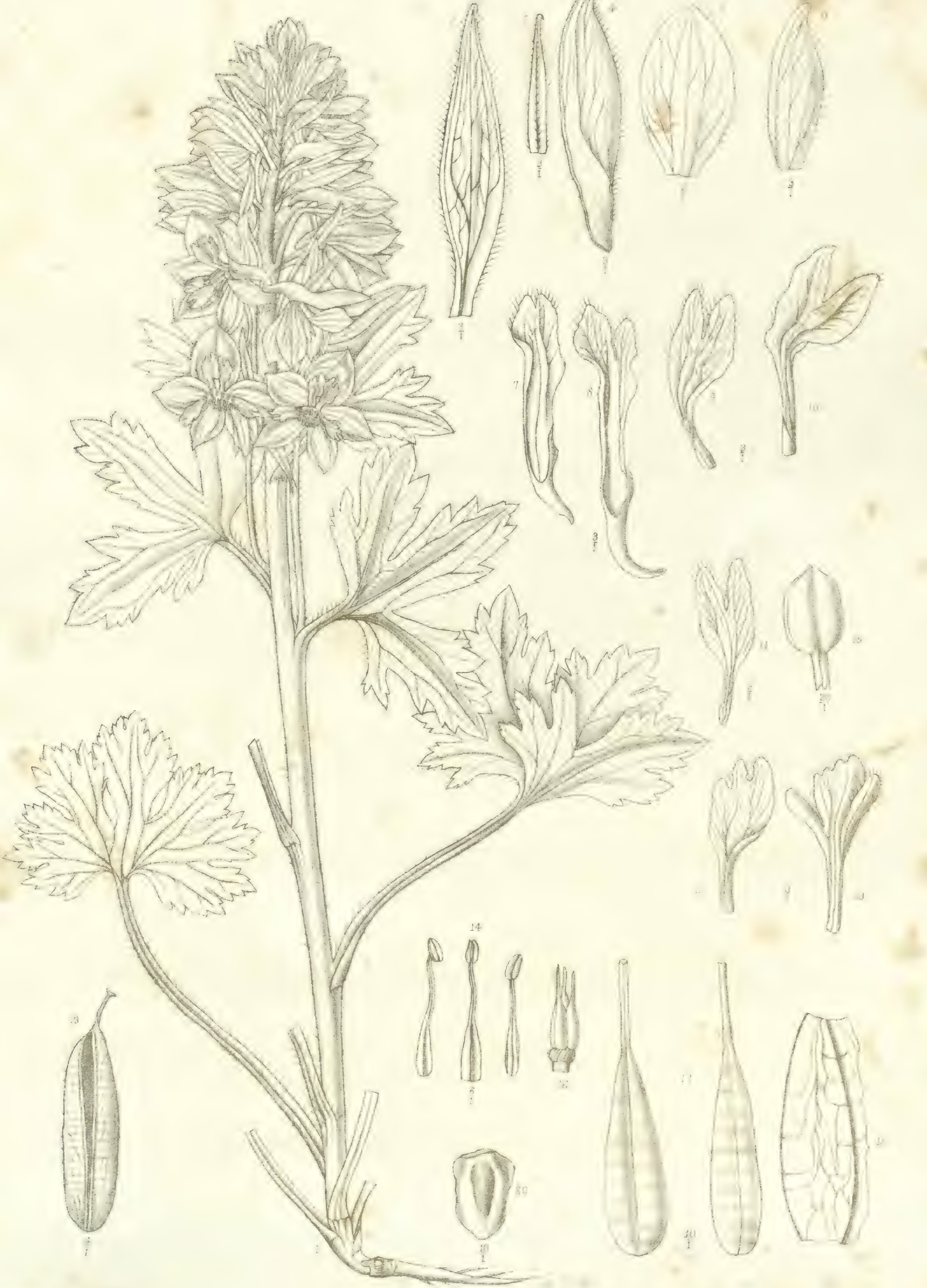
Descripsit P. Brühl

DELPHINIUM STAPELIOSMUM, P. B.

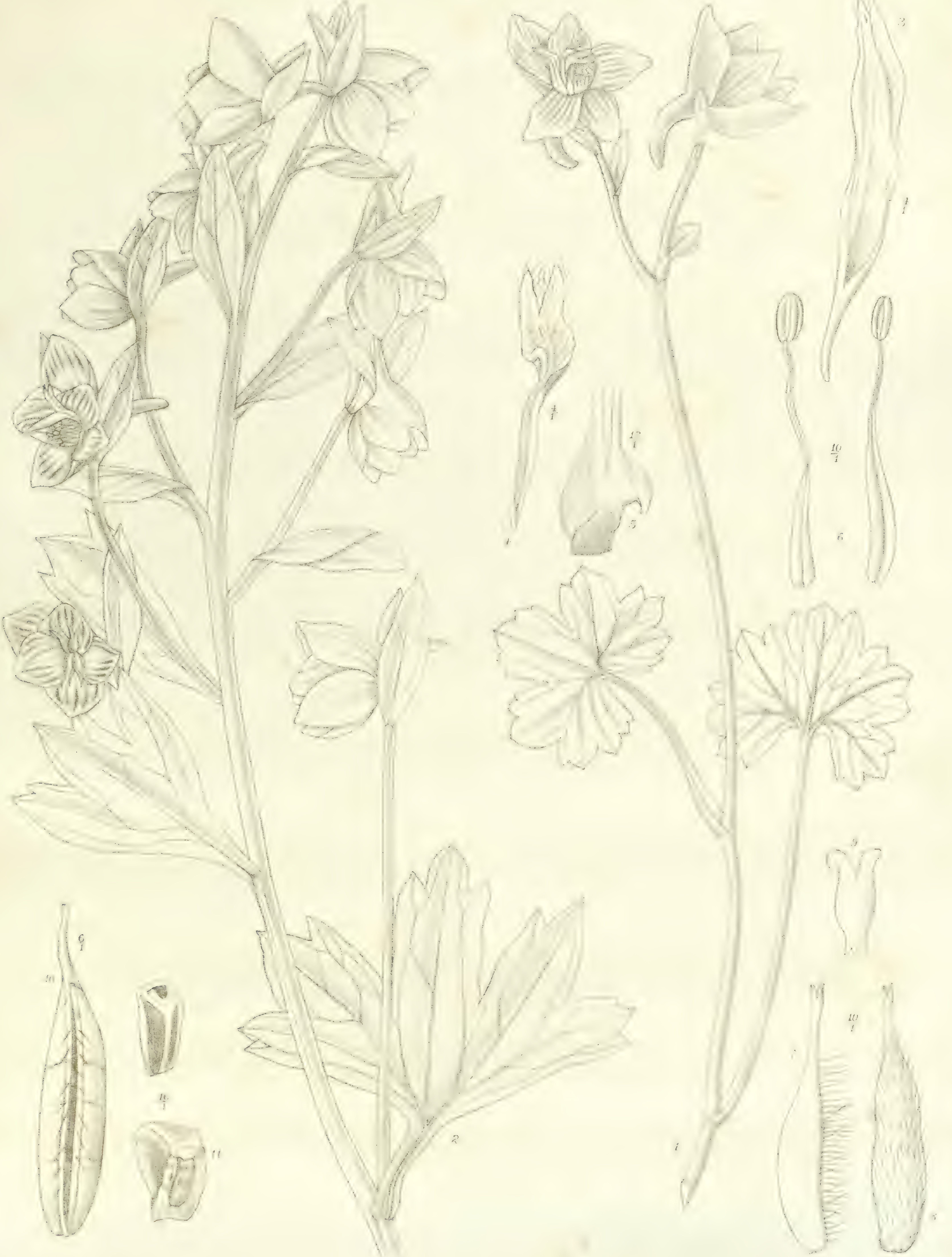
Lith by A.C. Chowdhary.



Plantam delt. Abdul Mollah,
partes sectas lineis,
descripsit P. Brühl.

DELPHINIUM DENSIFLORUM Duthie.

Lith. by A.C. Mukerjei.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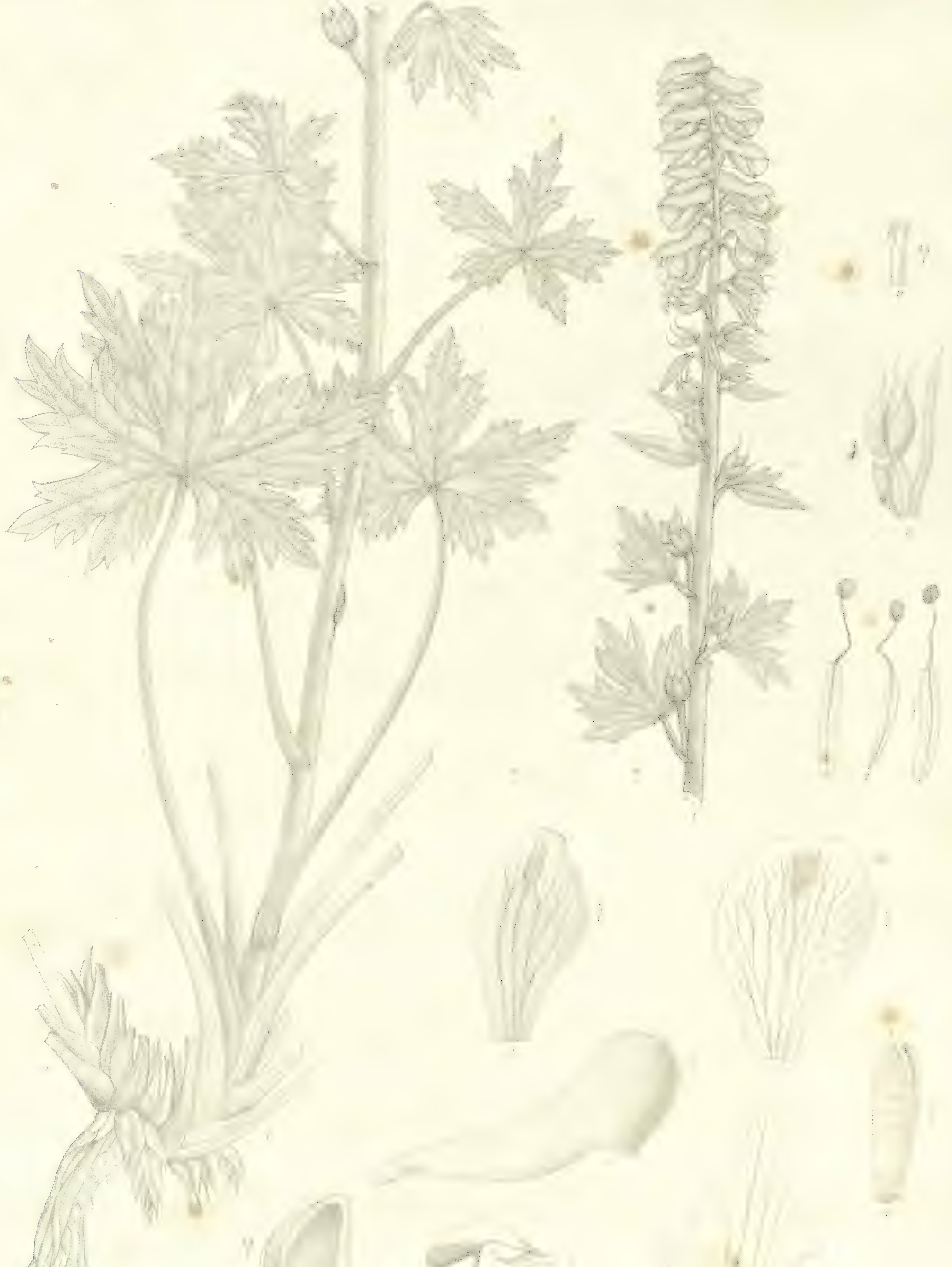
Sketched by A. S. [illegible]
[illegible] [illegible] [illegible]
[illegible] F. De Bel.

Lith by A. C. Singha.

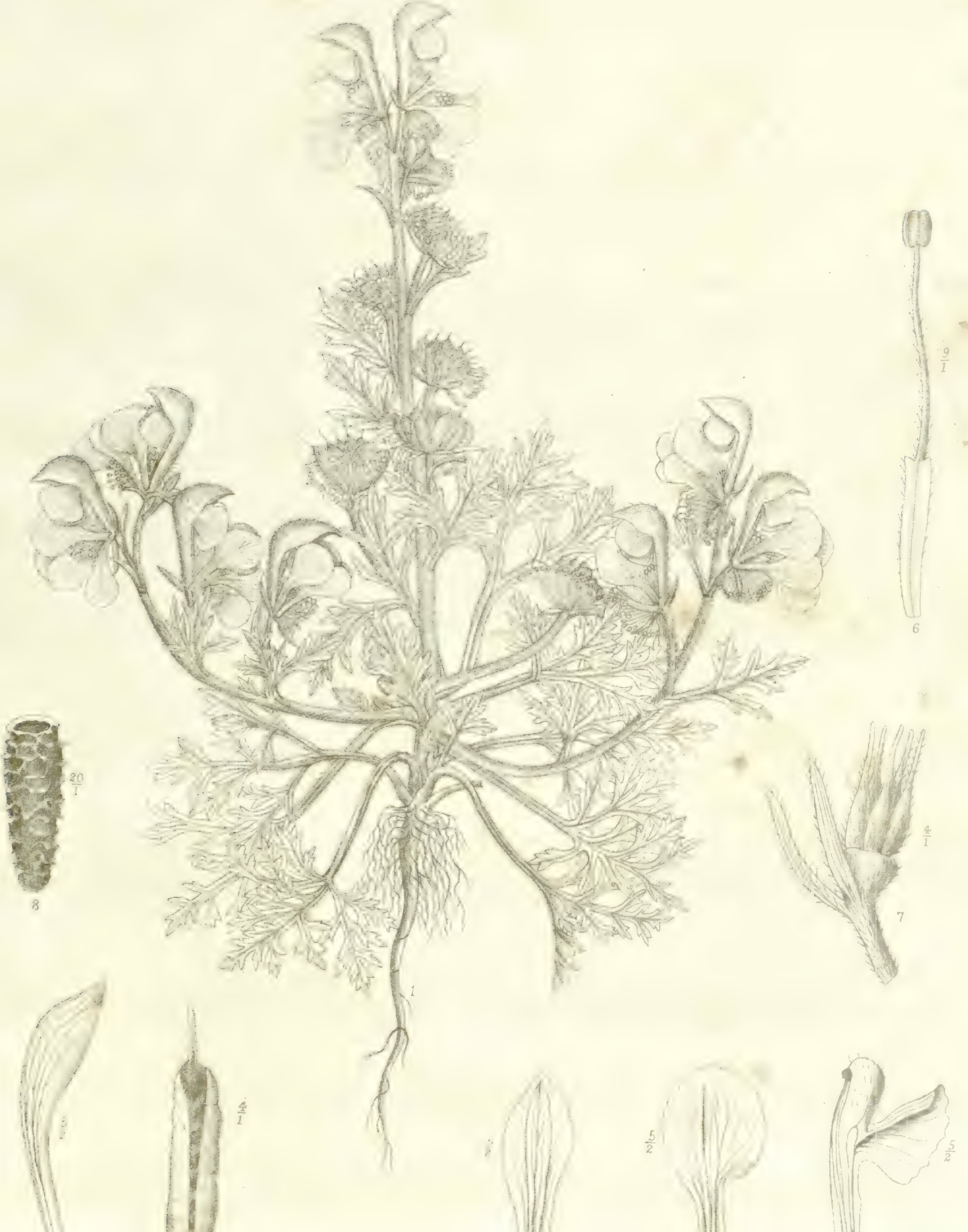
DELPHINIUM VISCOSUM, H.f. et T.



Plantam del^t G. [illegible]as-
partes sectas h[illegible]
descripsit P. Br[illegible].

ACONITUM LURIDUM, H.f. et T.

[illegible]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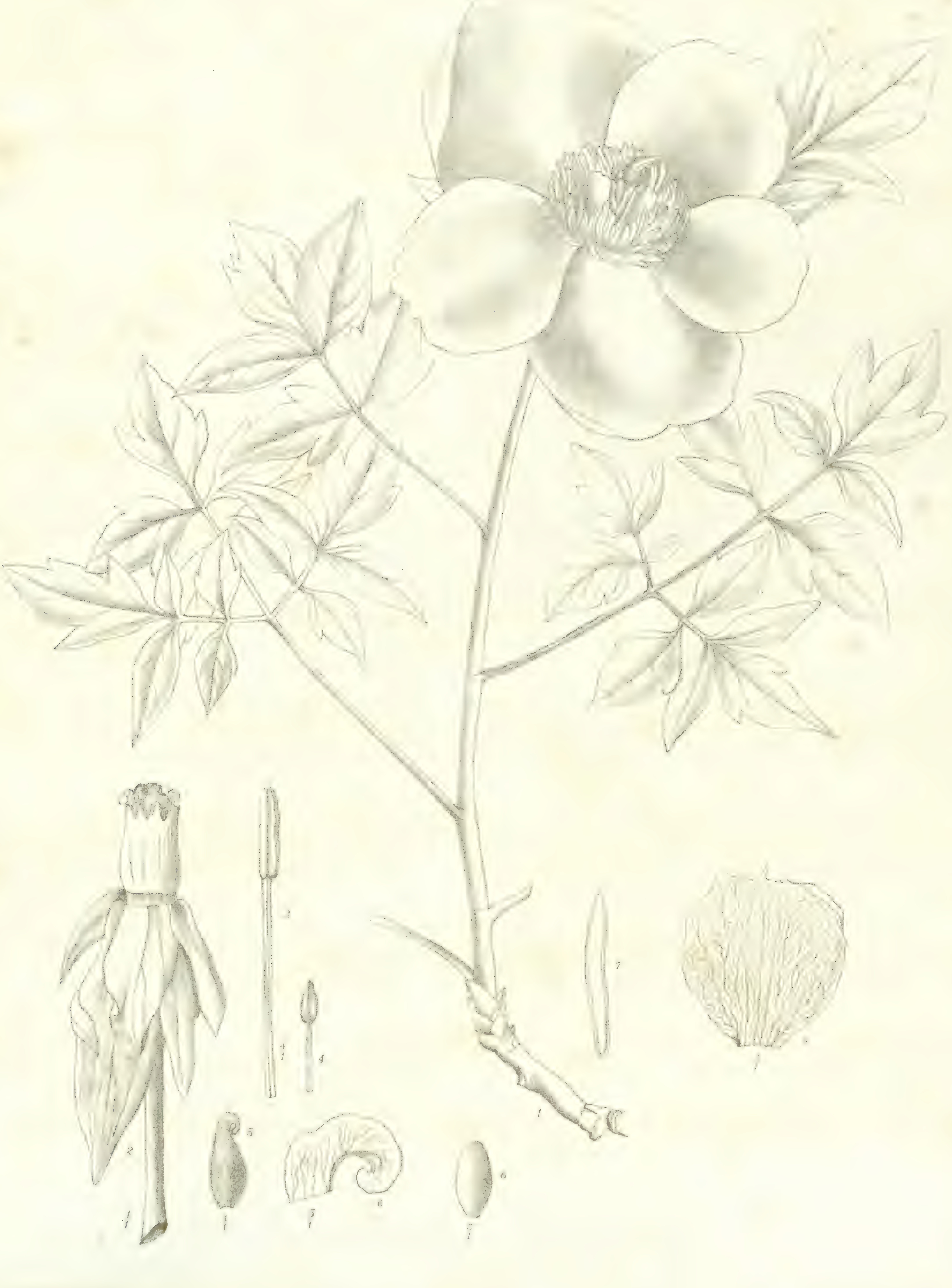
Plantam delt. G.C.Dass
partes sectas lineis
descripsit P. Brühl

Lith. by A. C. Mukerjei.

ACONITUM GYMNANDRUM, Maxim.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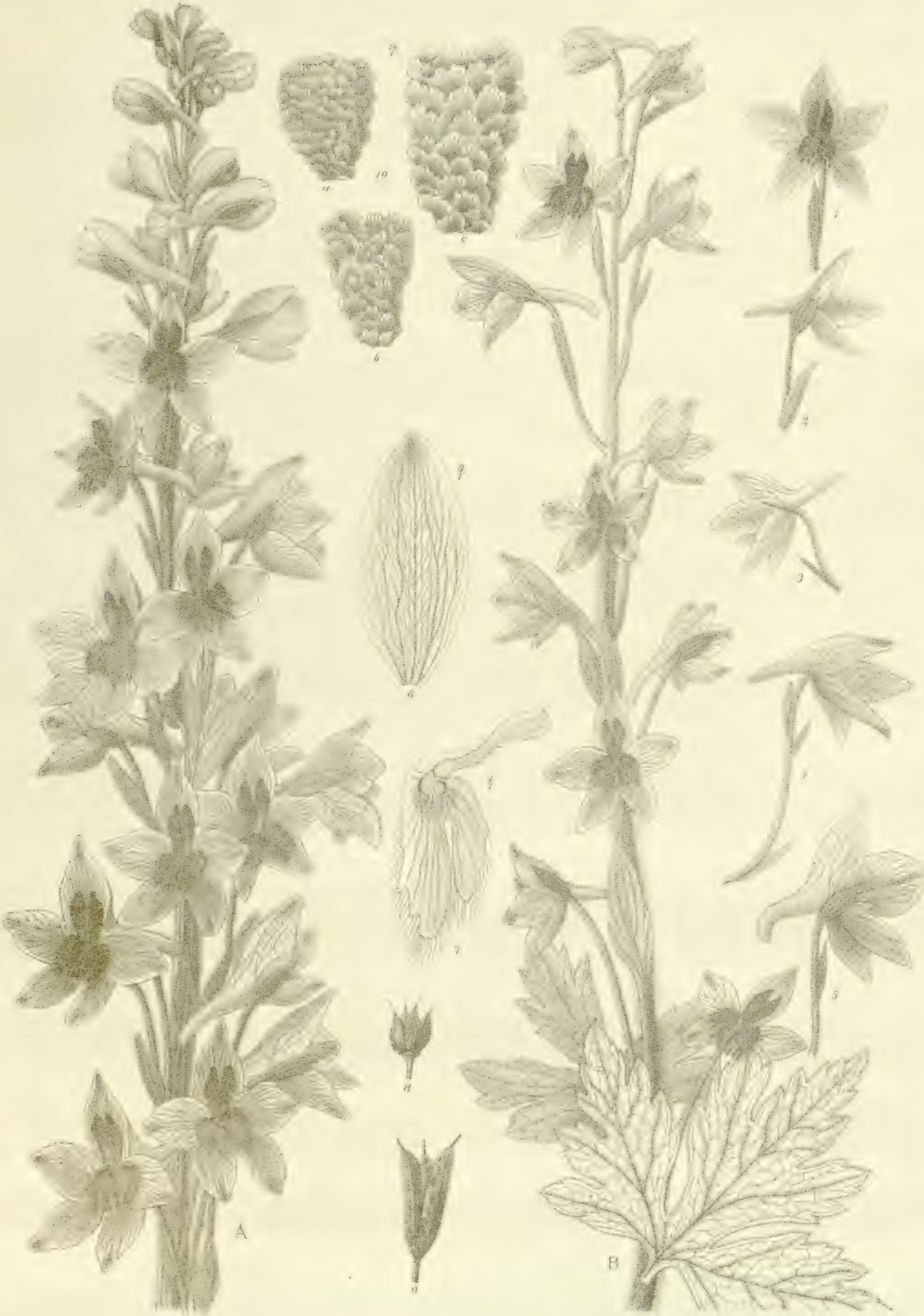
Plantam del. K. P. Dass;
partes sectas lineis
descripsit P. Brühl.

PAEONIA MOUTAN, D.C.
SUBSP. ATAVA, P.B.

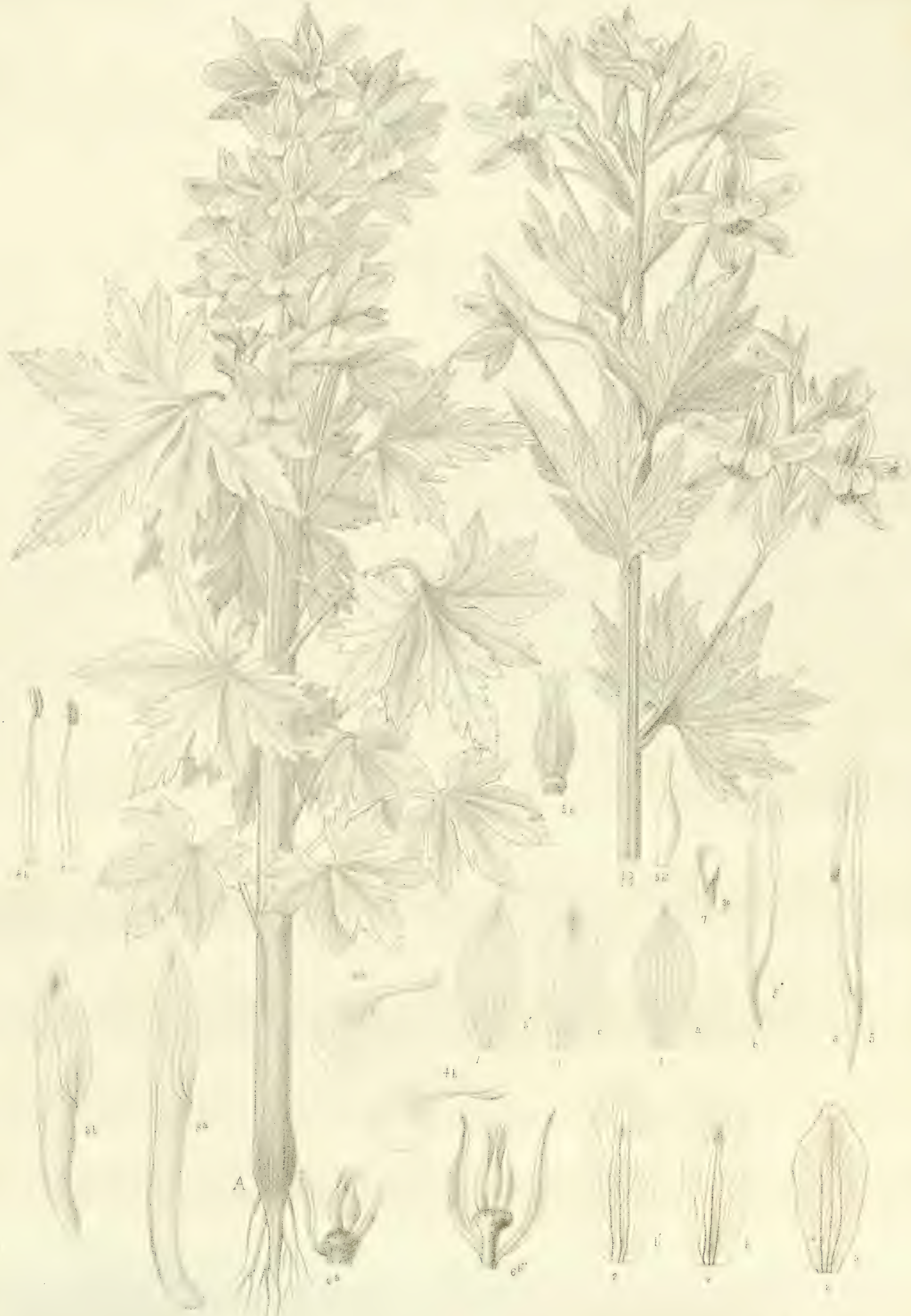
Lith. by Chitra Silpi Co.



P. Brühl lineis descripsit.

Lith. by S.C.Mondul.

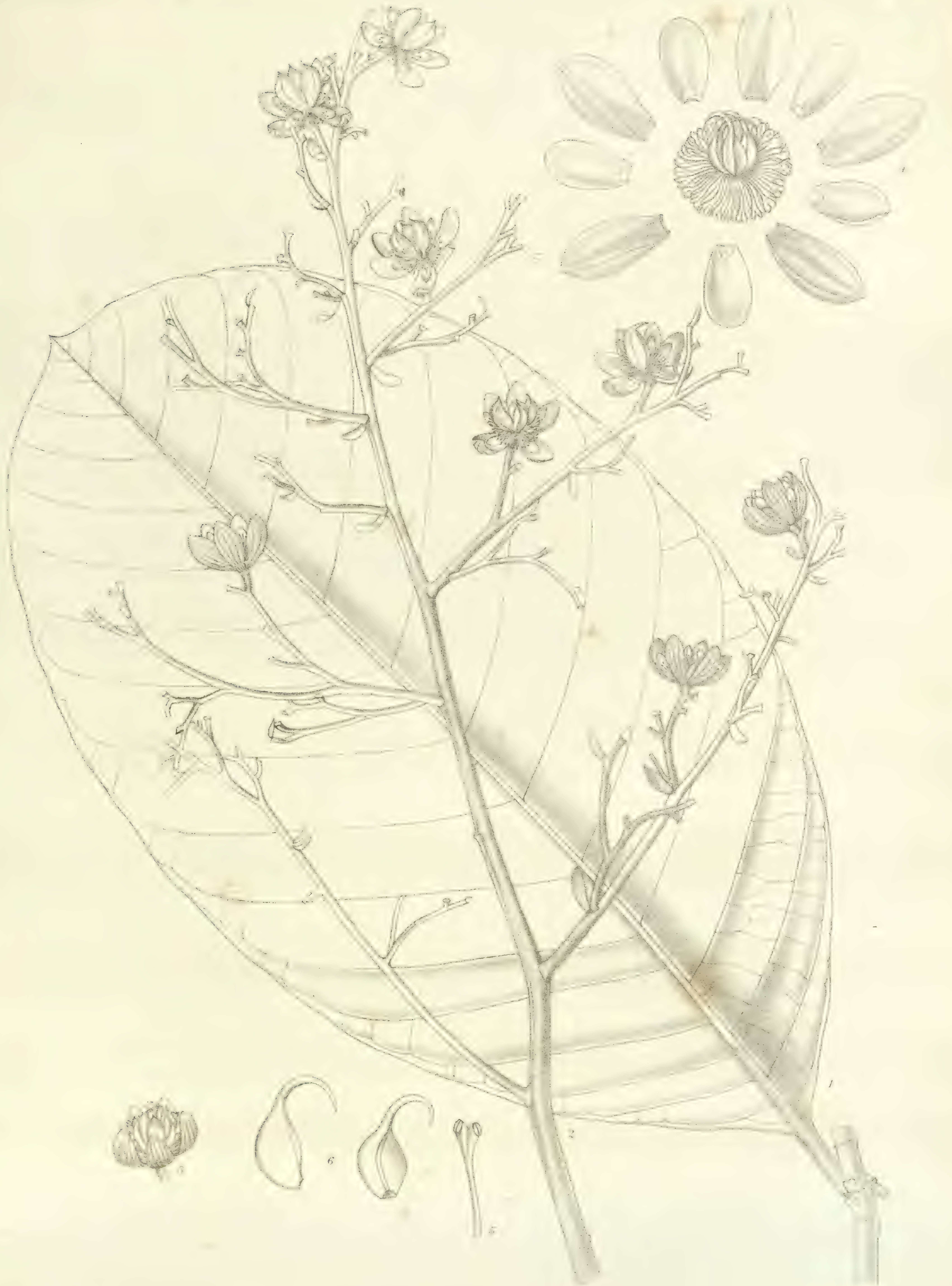
DELPHINIUM SPECIOSUM, M.Bieb.
subsp. RANUNCULIFOLIUM, Wall.
(A) var. thyrsantha, P.B. (B) var. katatricha, P.B.



Stirpes etque partes sectas
lineis discripsit F. Brühl

Lith by A. C. Chowdhary

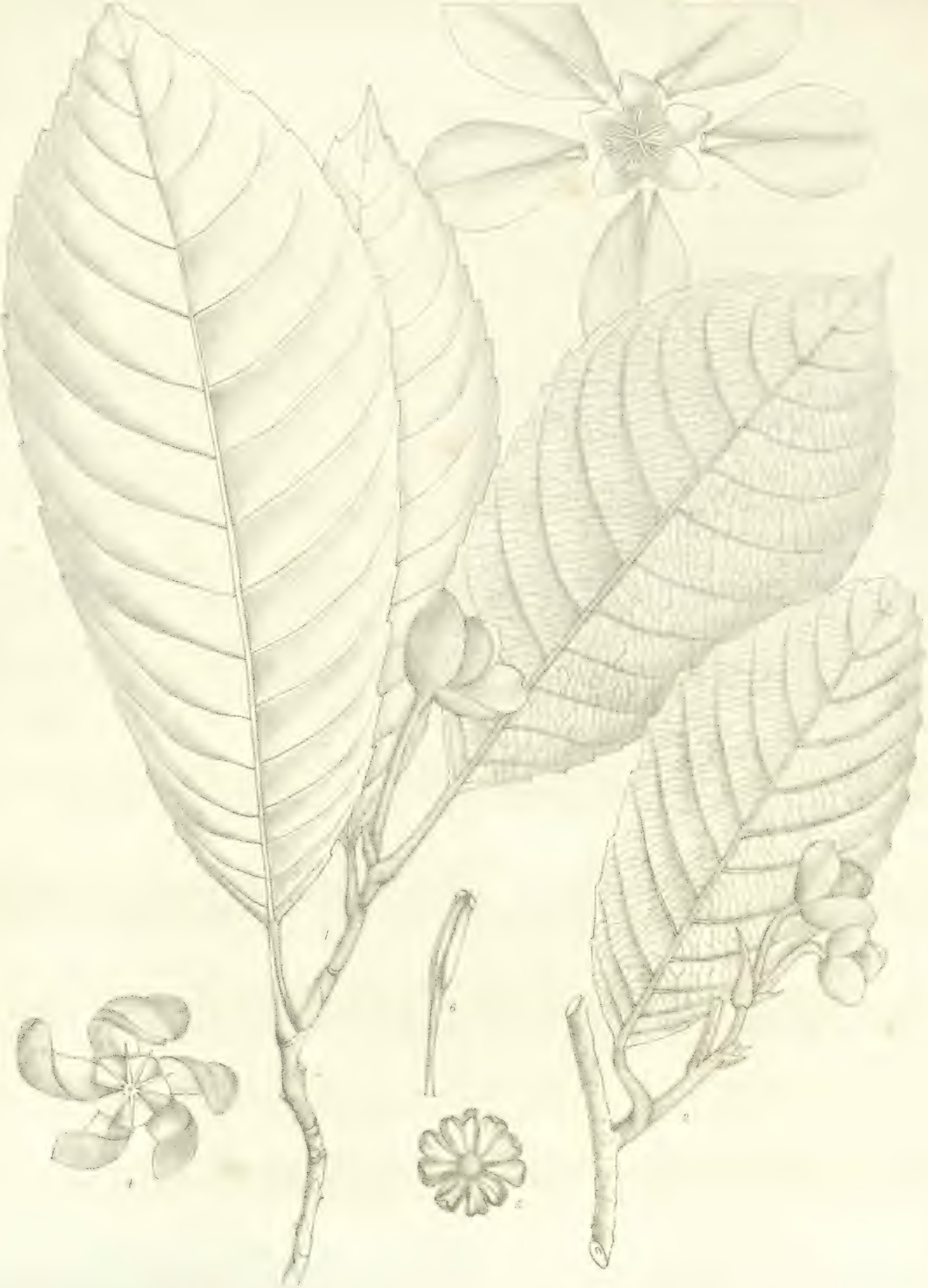
DELPHINIUM PACHYCENTRUM, Hemsl.
(A,a) subsp. Hemsleyi; (B,b) subsp. tsangense, P.B.



Drawn by A. L. Singh.

Lith: by A. D. Molla.

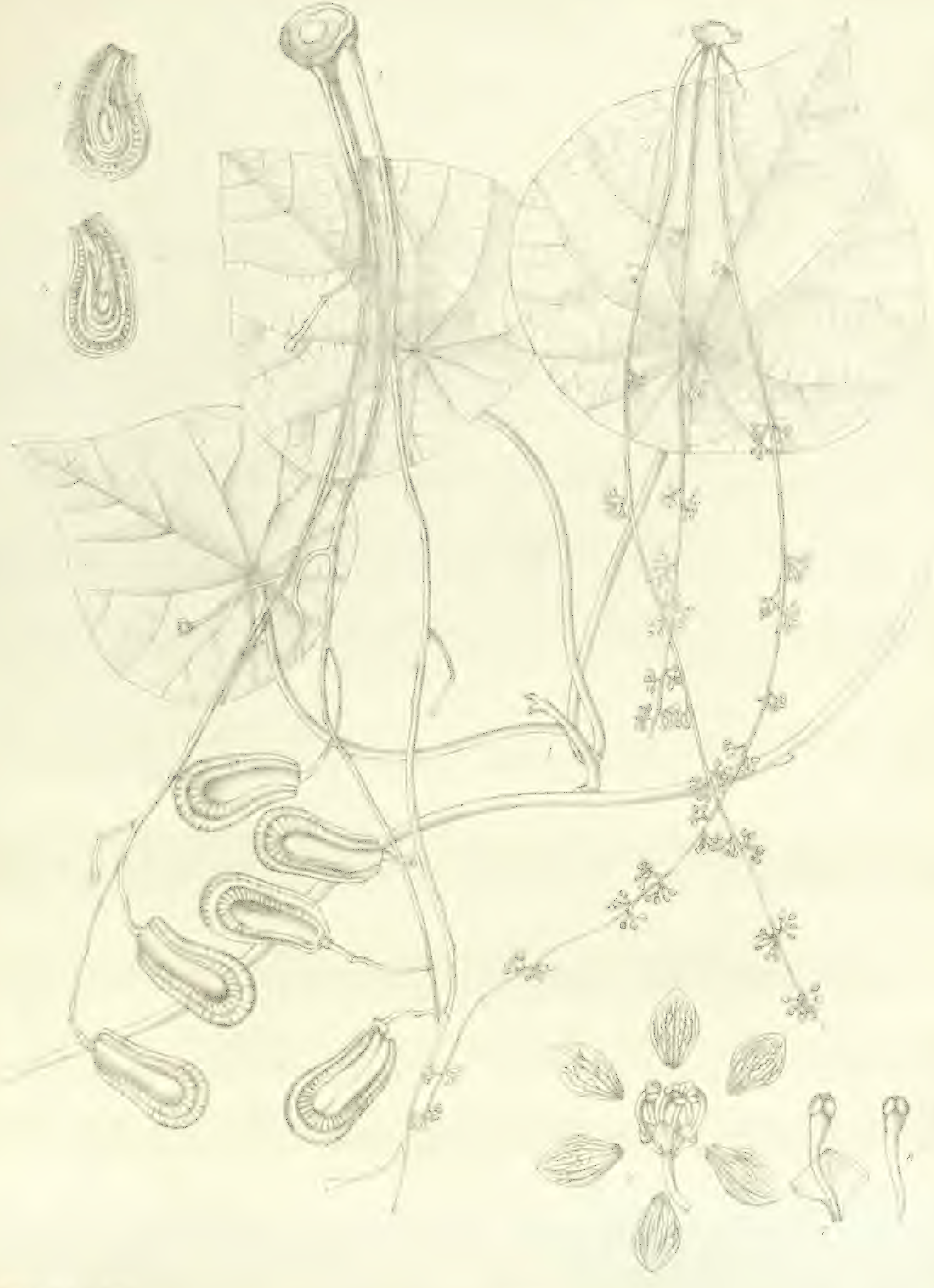
TETRACERA GRANDIS, King.



Drawn by G. C. Dass.

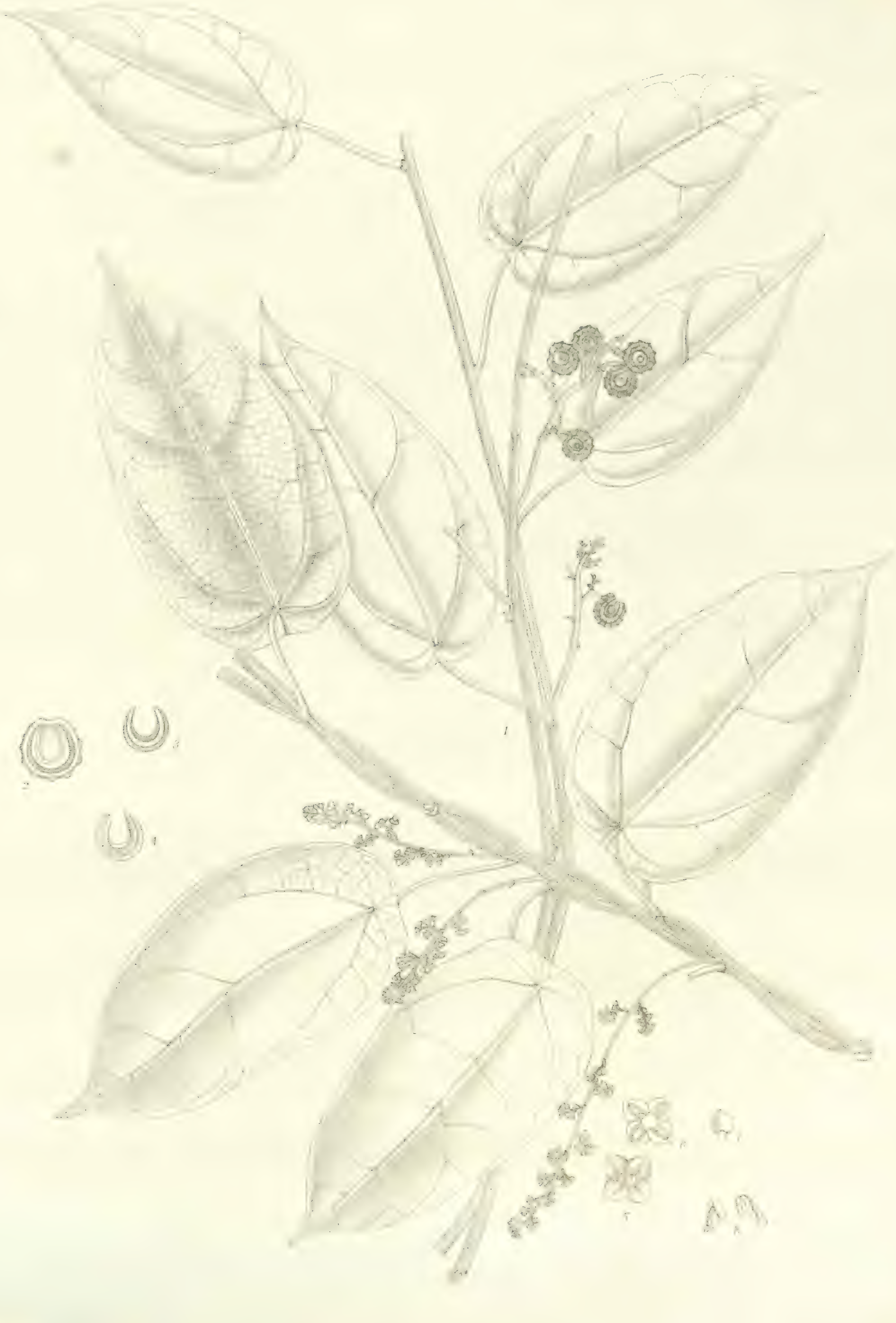
Lith by Chitra Silpi

WORMIA MELIOSMÆFOLIA, King.



COCCULUS KUNSTLERI, King.

Lith by Chitra Silpi Co.

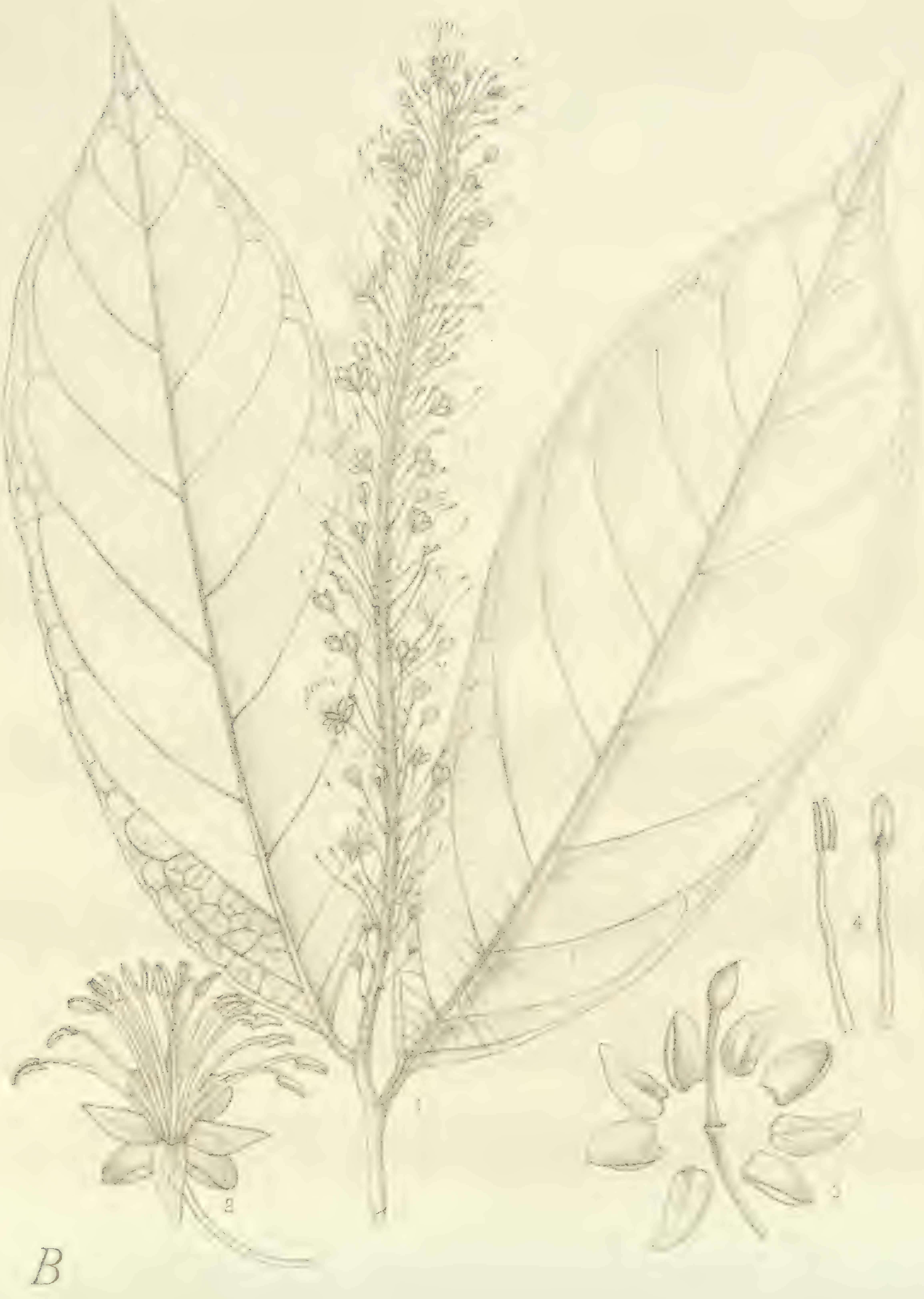


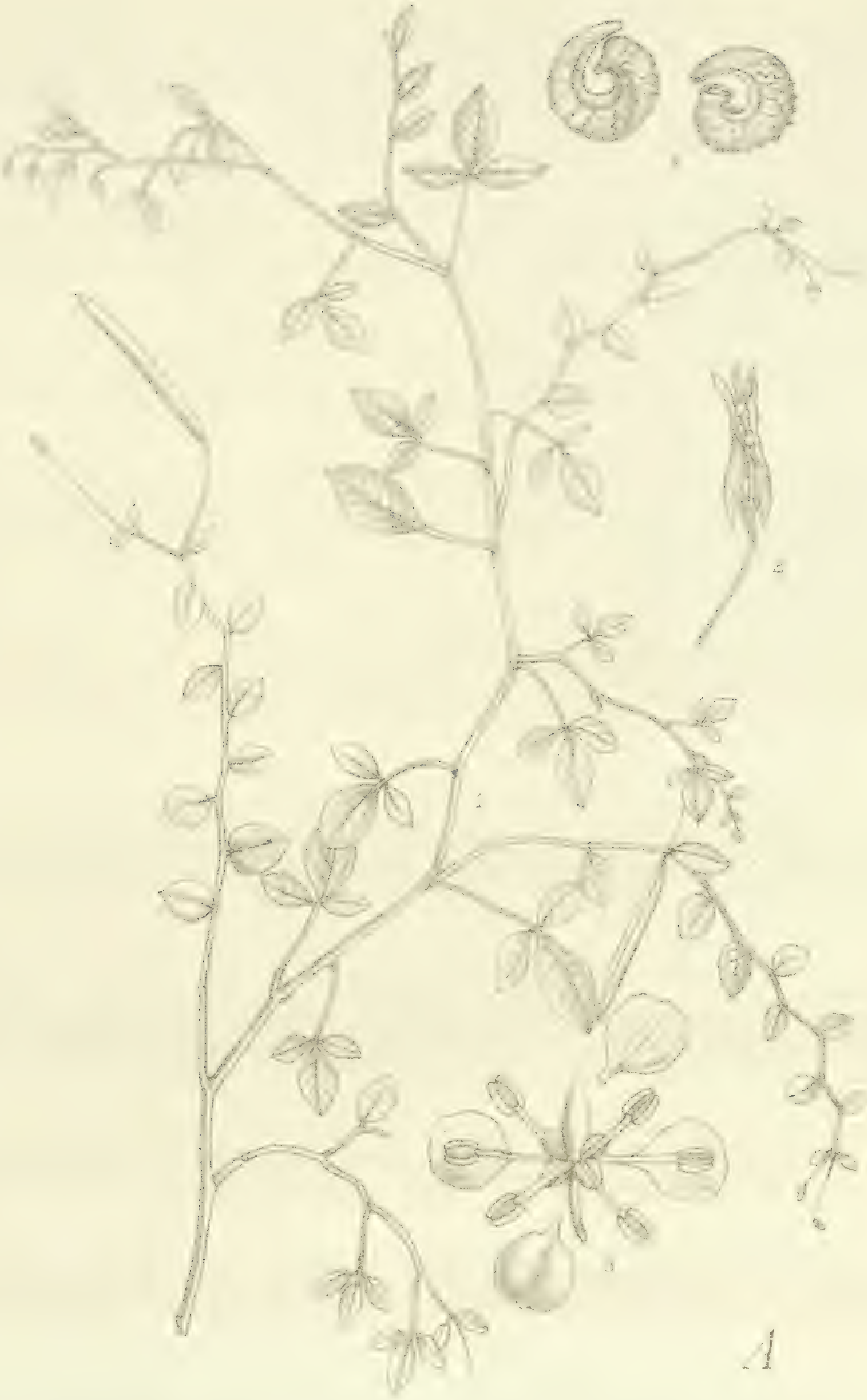
Drawn by A.D. Molla.

Lith: by K.P. Dass.

CYCLEA ELEGANS, King.

New Indian Plants.





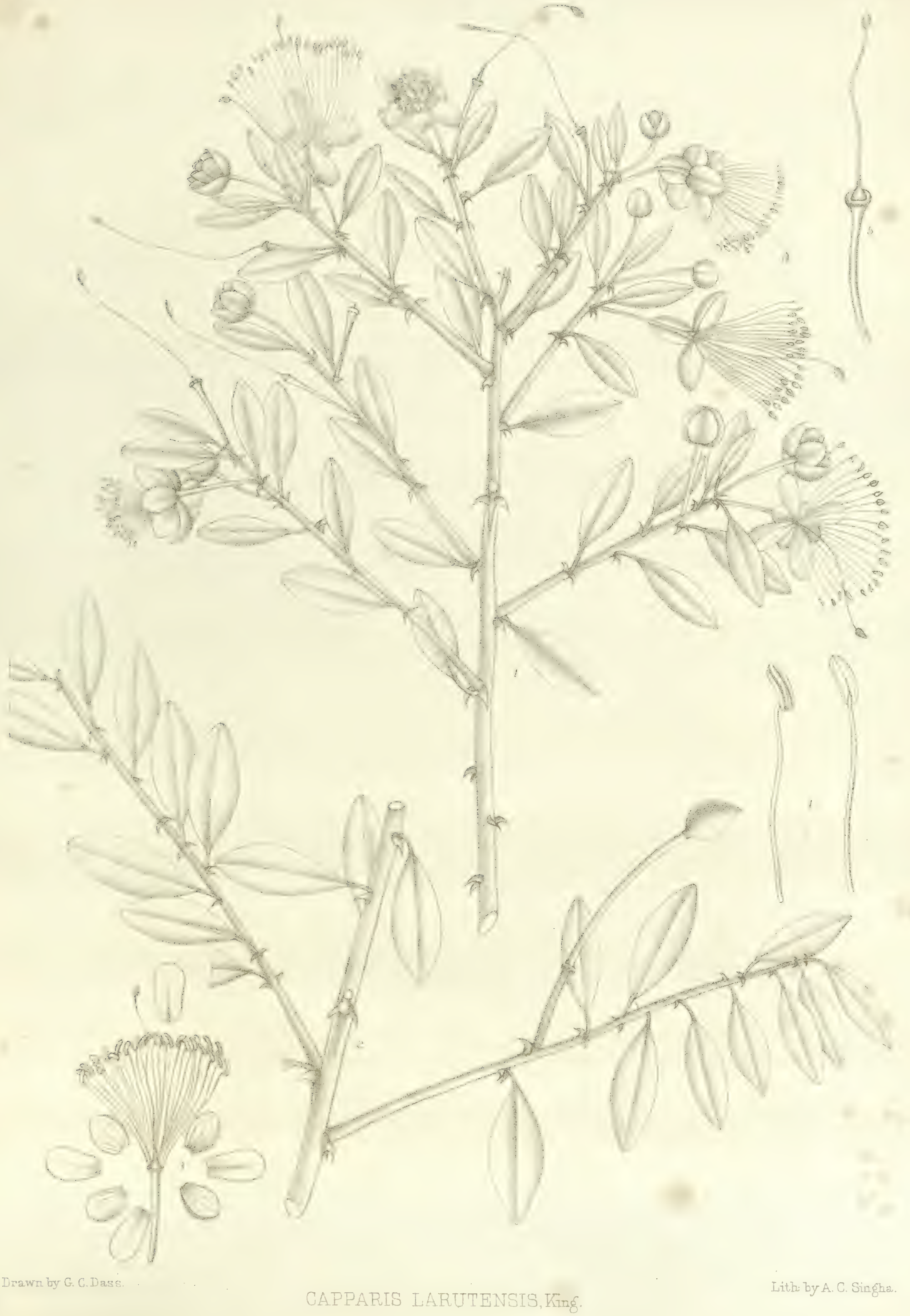
Ann. Roy. Bot. Garden, Calcutta, Vol. 5, PLATE 113.

Drawn by A.L. Singh.

CAPPARIS GALLATLYI, King.

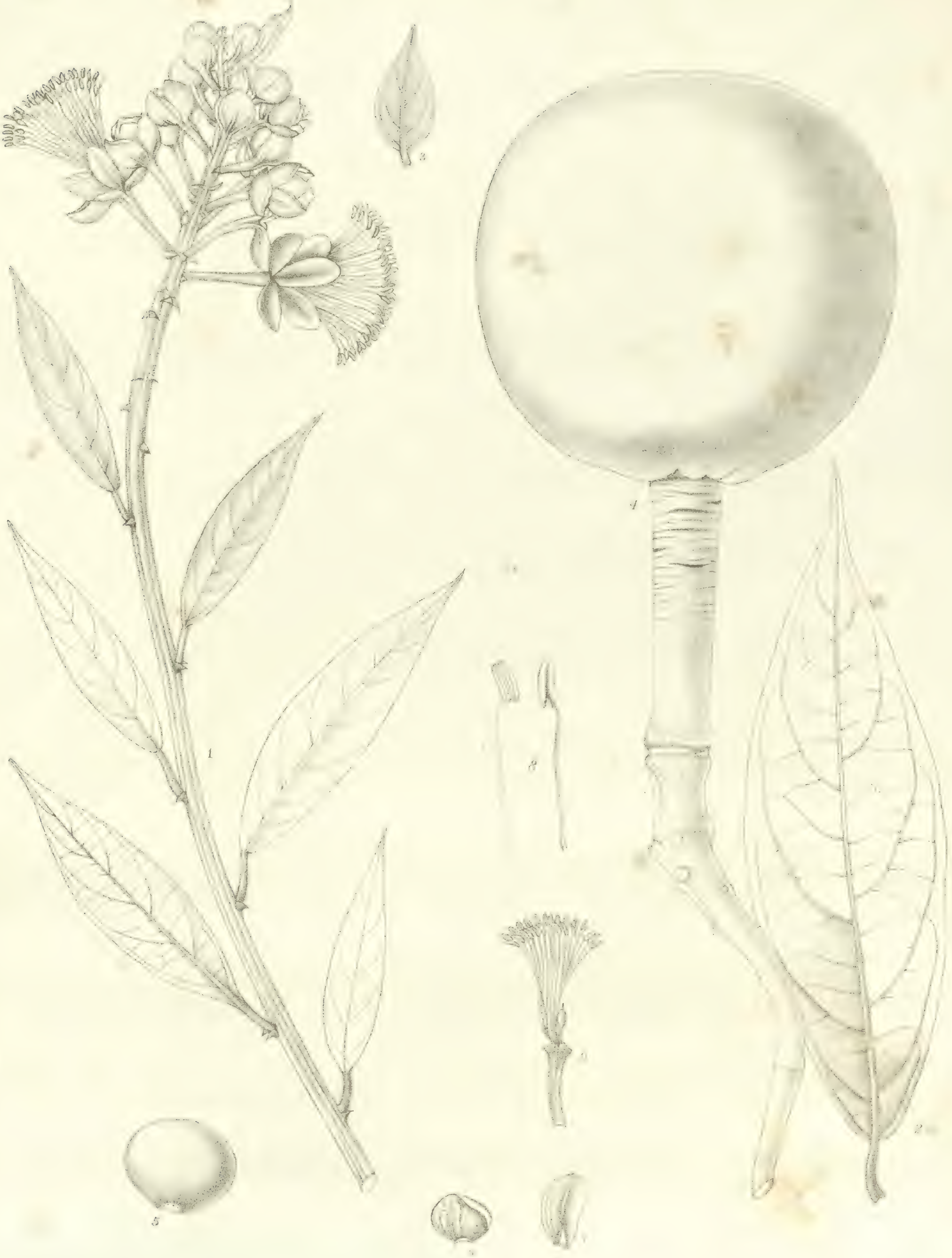
CLEOME HULLETII, King.

Lith by K. H. Das.



Drawn by G. C. Dass. Lith: by A. C. Singha.

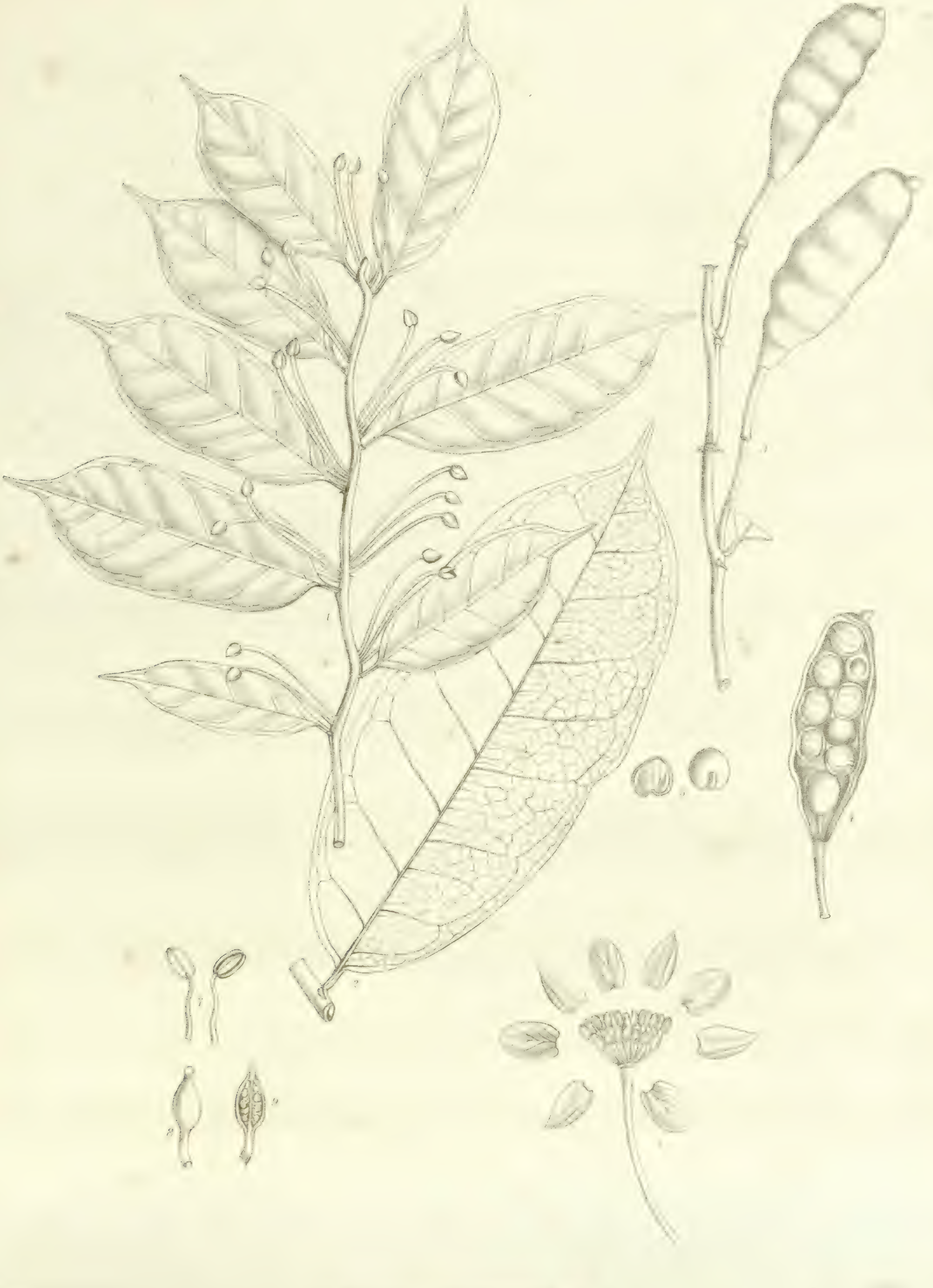
CAPPARIS LARUTENSIS, King.



Drawn by A. L. Singh.

CAPPARIS SCORTECHINII, King.

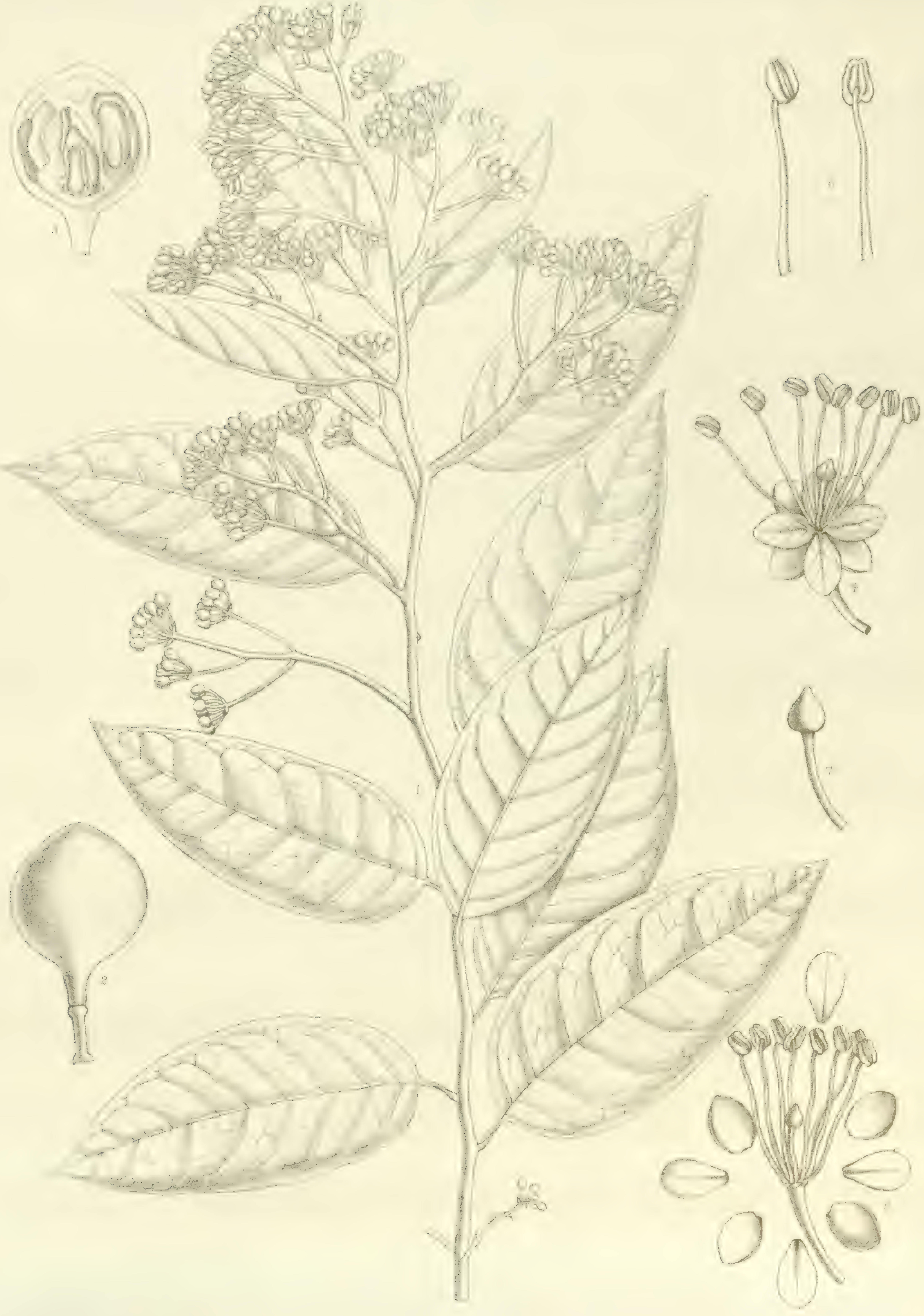
Lith: by A. D. Molla.



Drawn by K. P. Dass.

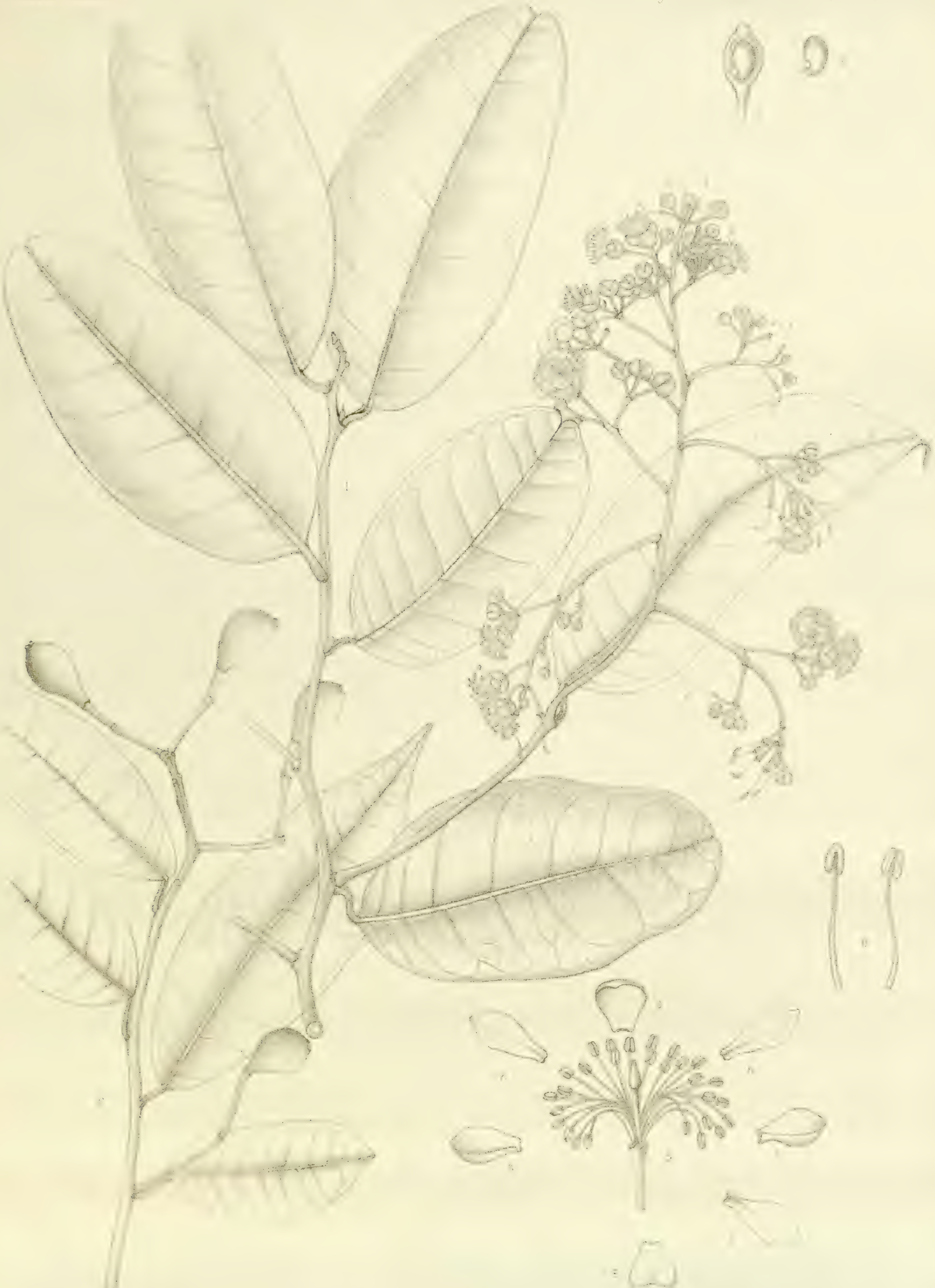
Lith. by A.D. Molla.

CAPPARIS CUCURBITINA, King.



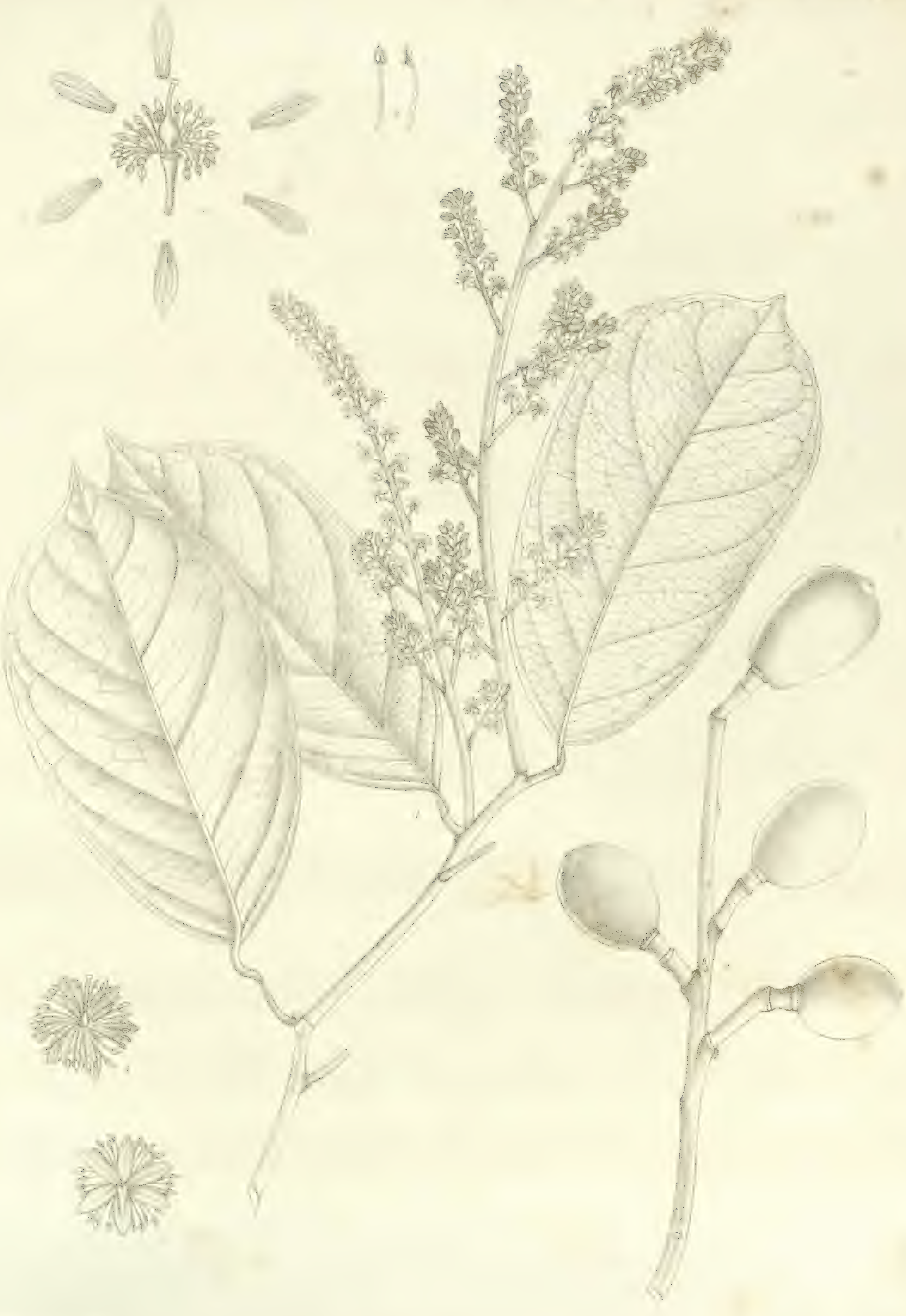
Drawn by K. P. Dass.
Lith. by A. C. Mukerjei.

CAPPARIS ANDAMANICA, King.



Drawn by D. N. [illegible] Lith. by K. H. Das.

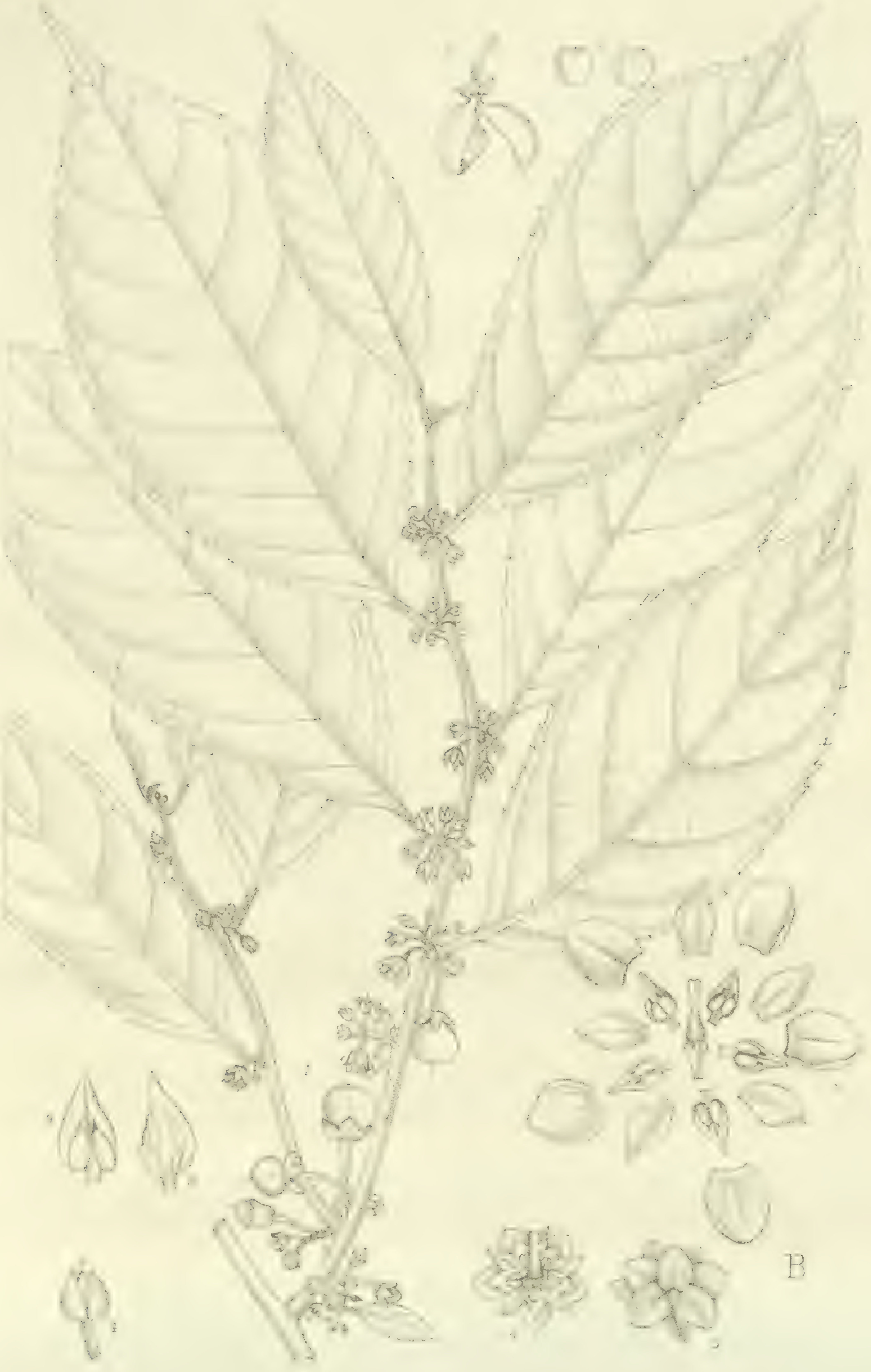
CAPPARIS AMBIGUA, Kurz.



Drawn by G. C. Dass.

ROYDSIA SCORTECHINII, King.

Lith: by A. C. Singha.



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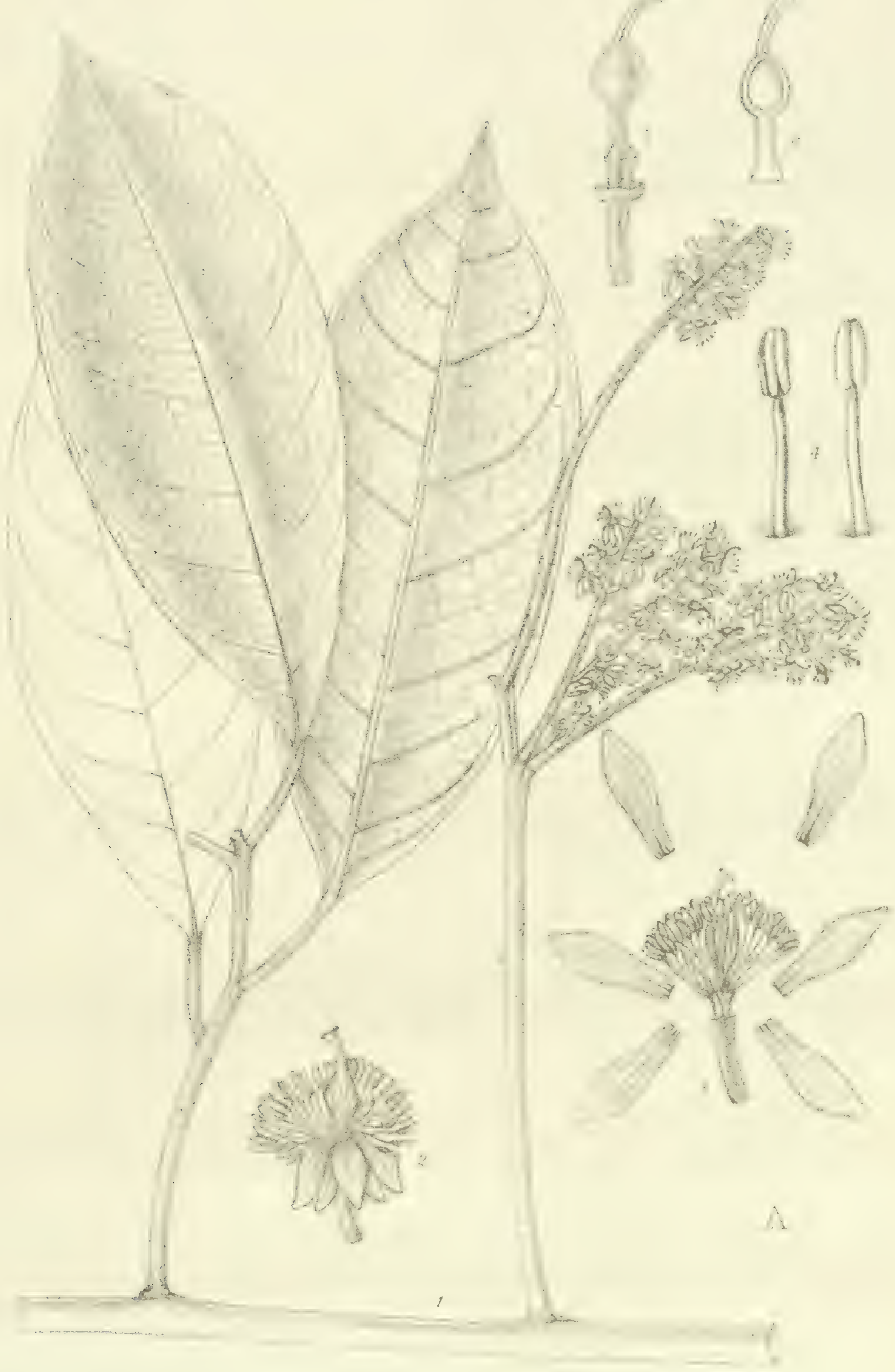
ALSODEIA MEMBRANACEA, King.

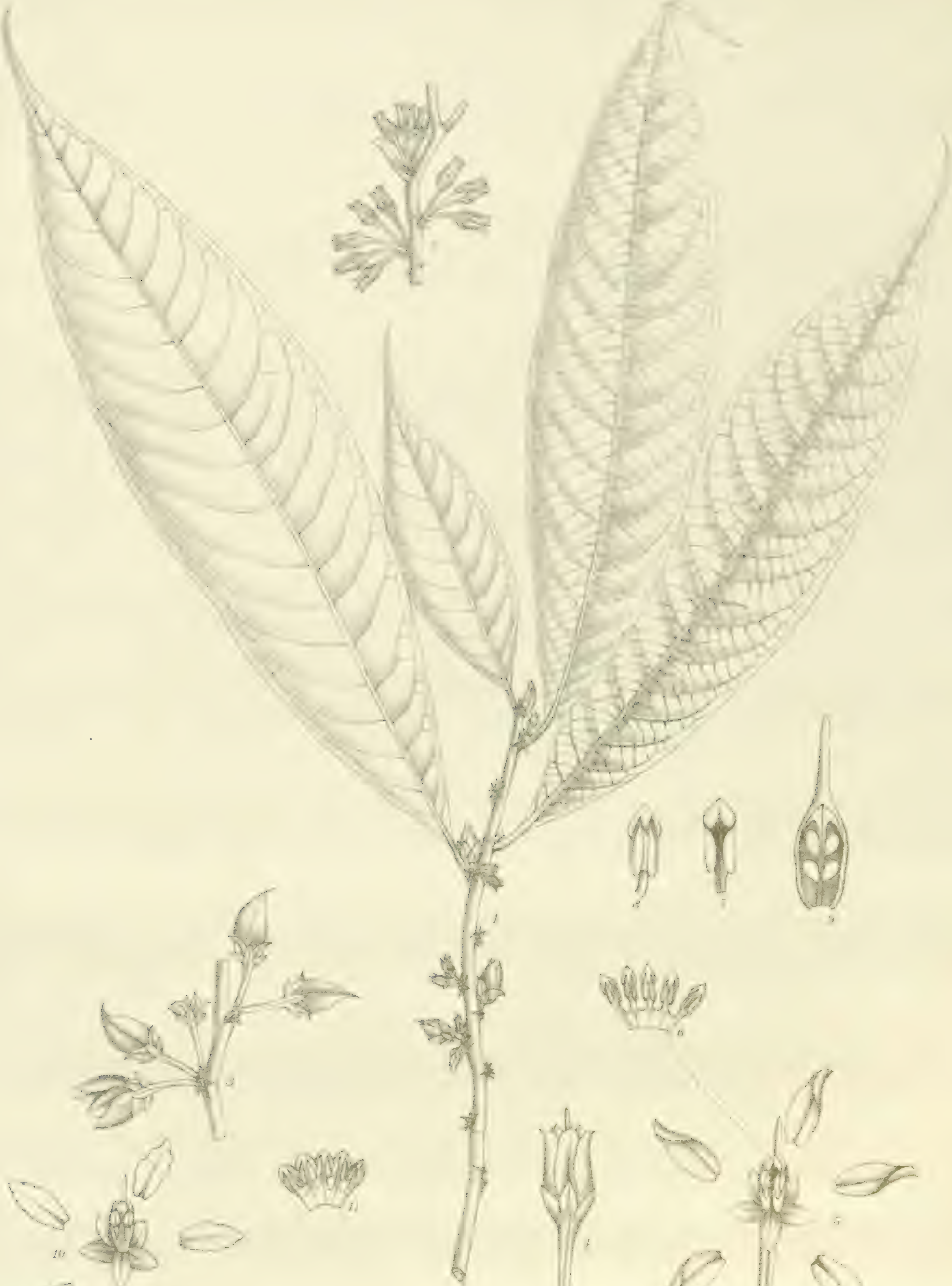


Drawn by K. P. Dass.

ROYDSIA FASCICULATA, King.

Lith: by A. D. Molla.

Ann. Roy. Bot. Garden, Calcutta, Vol. 5, PLATE 140.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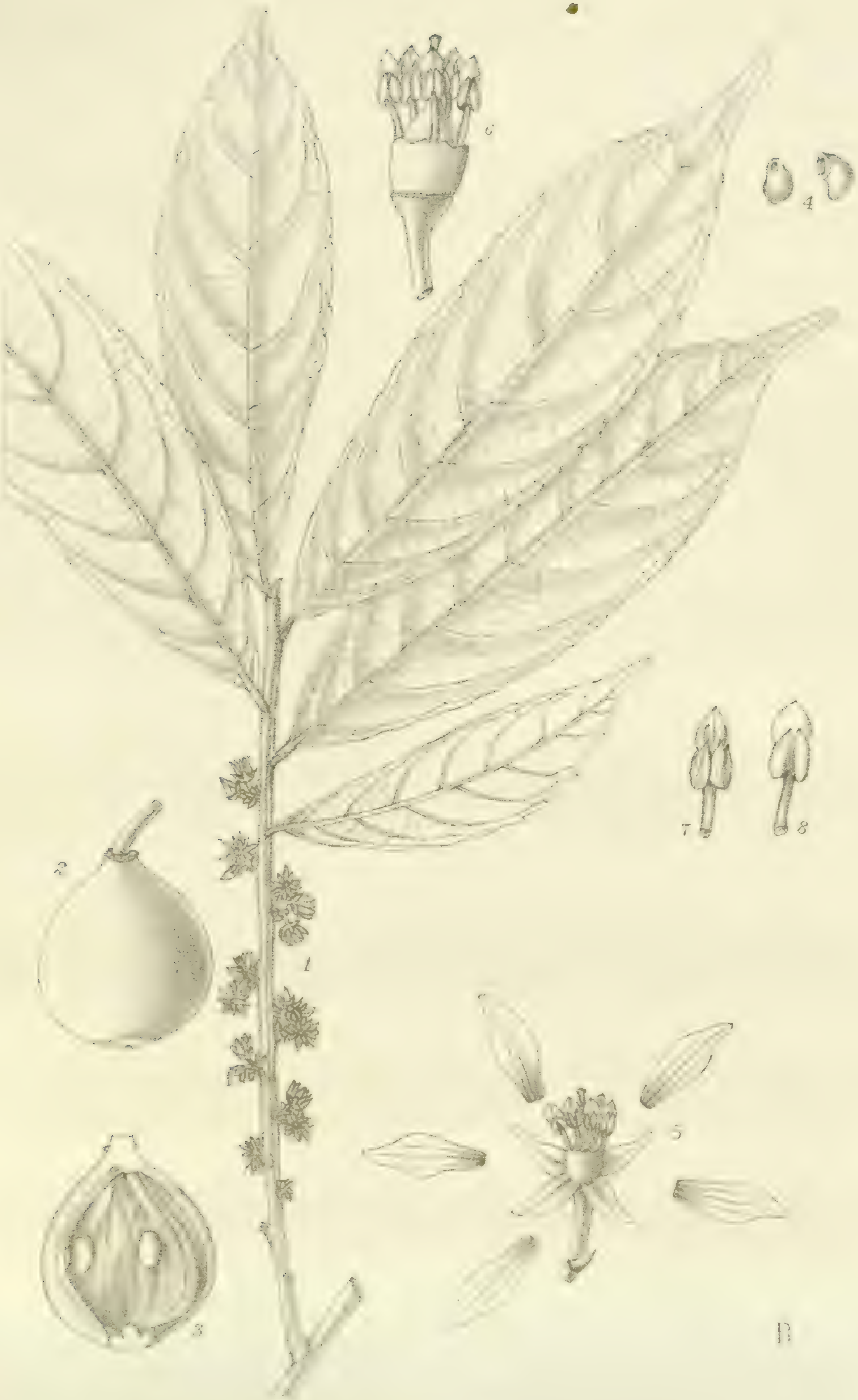
Drawn by A. E. Mahon.

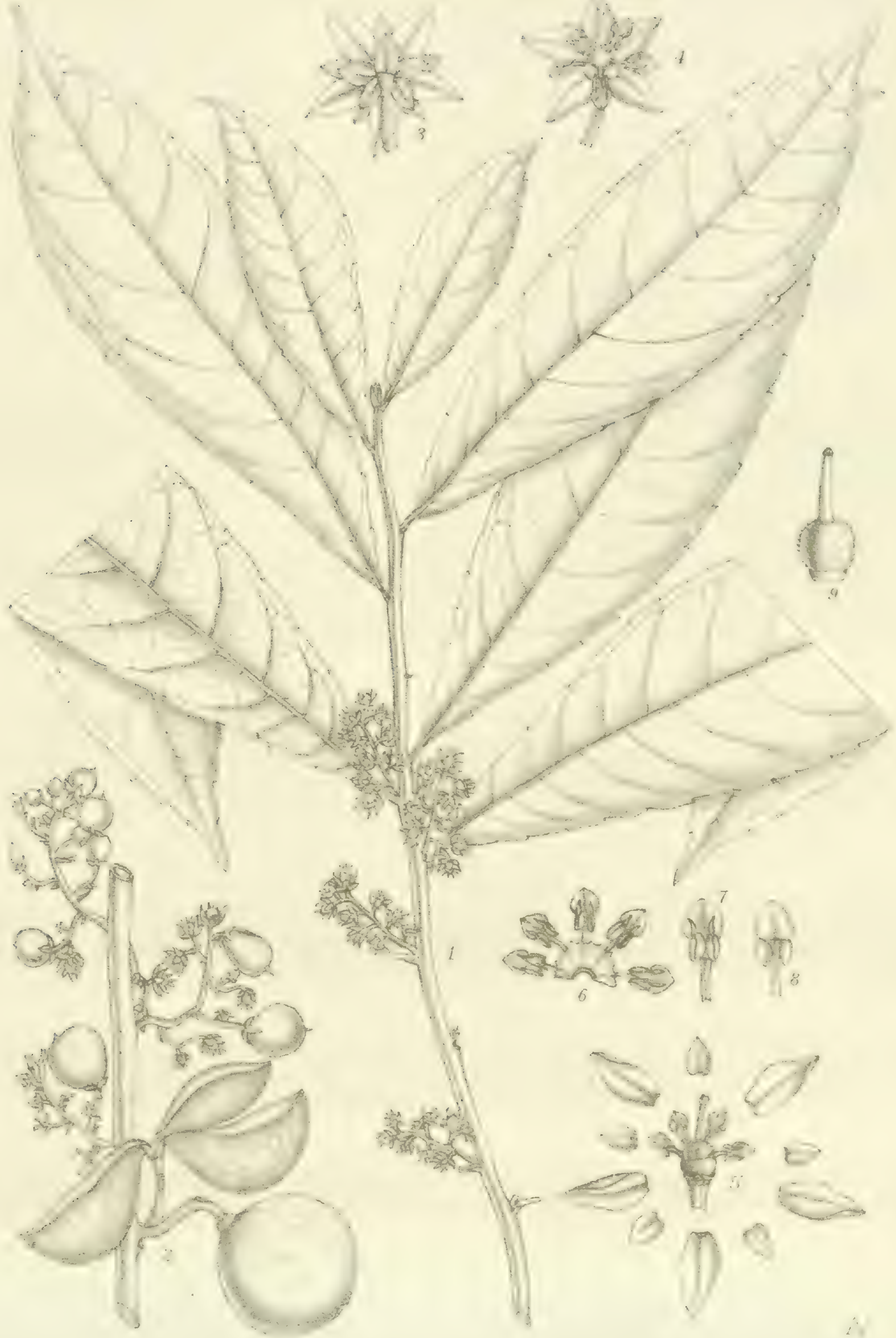
ALSODEIA KUNSTLERIANA, King.

Lith. by A. L. Singh.



Drawn by A. L. Singh.

ALSODEIA WRAYI, King.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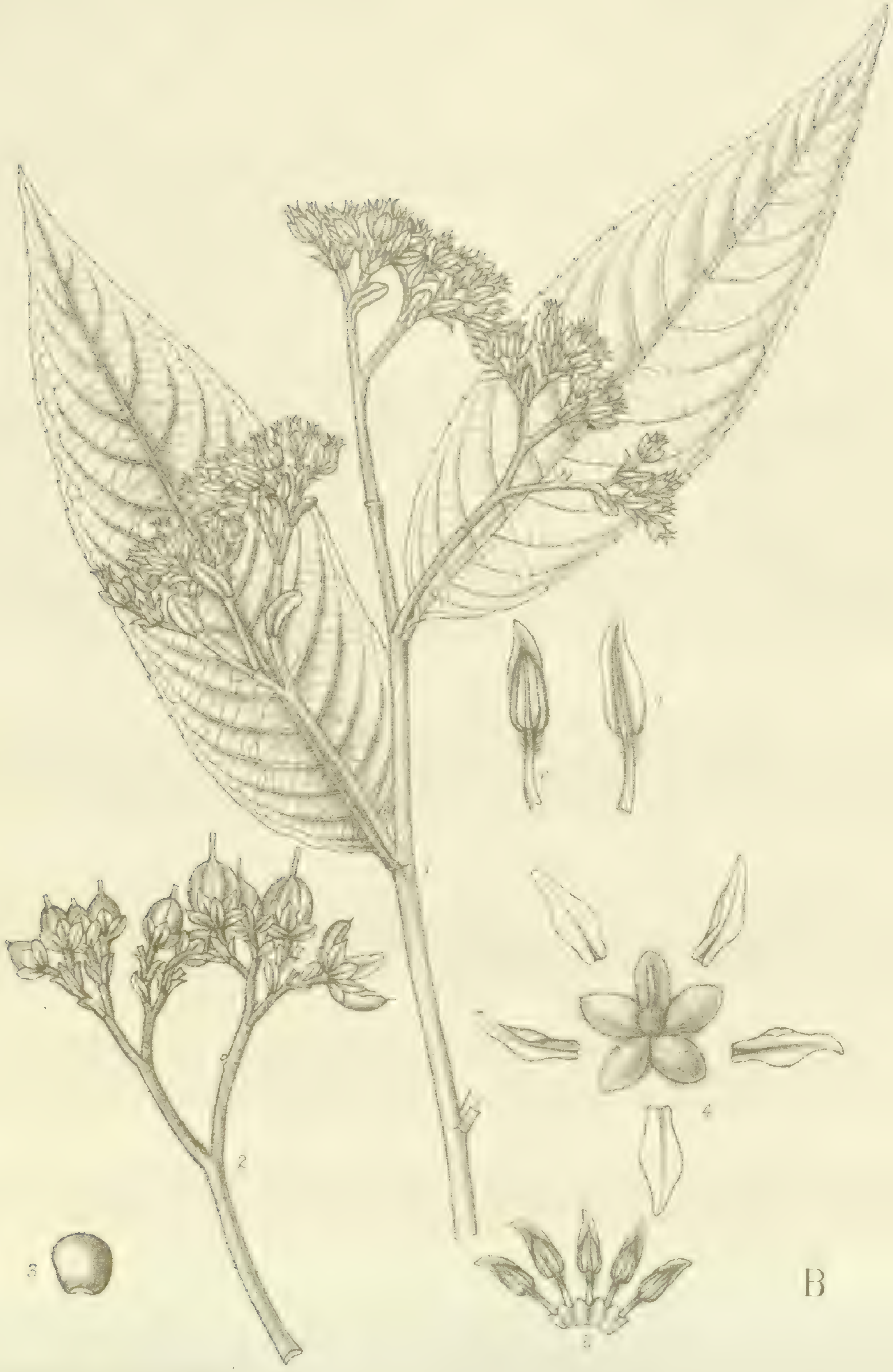
Drawn by D. N. Chowdhury.

ALSODEIA HOOKERIANA, King.

Lith: by A.L. Singh.



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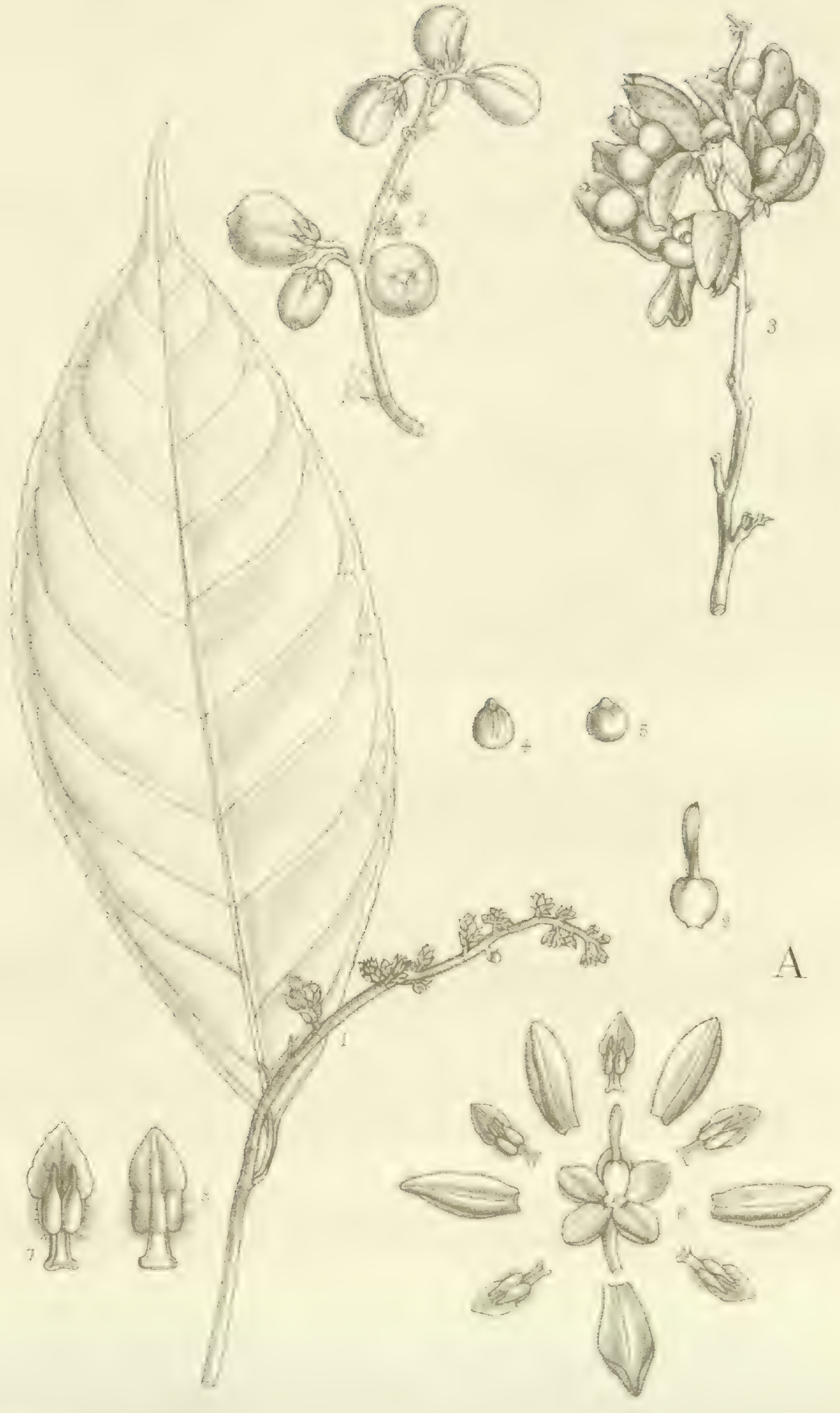
ALSODEIA FLORIBUNDA, King.

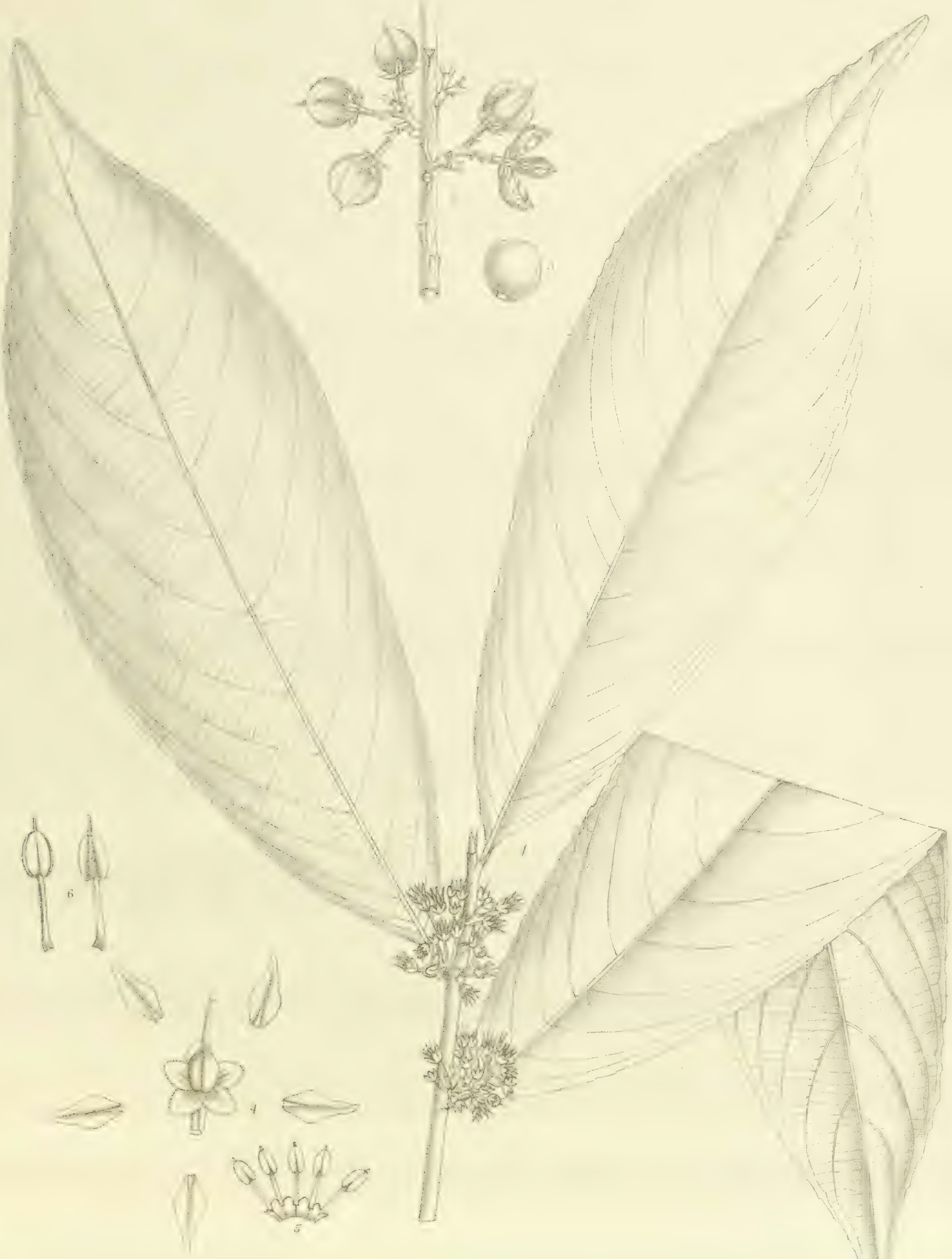


Drawn by K.P. Dass.

Lith. by A. C. Mukerjei

ALSODEIA CINEREA, King.

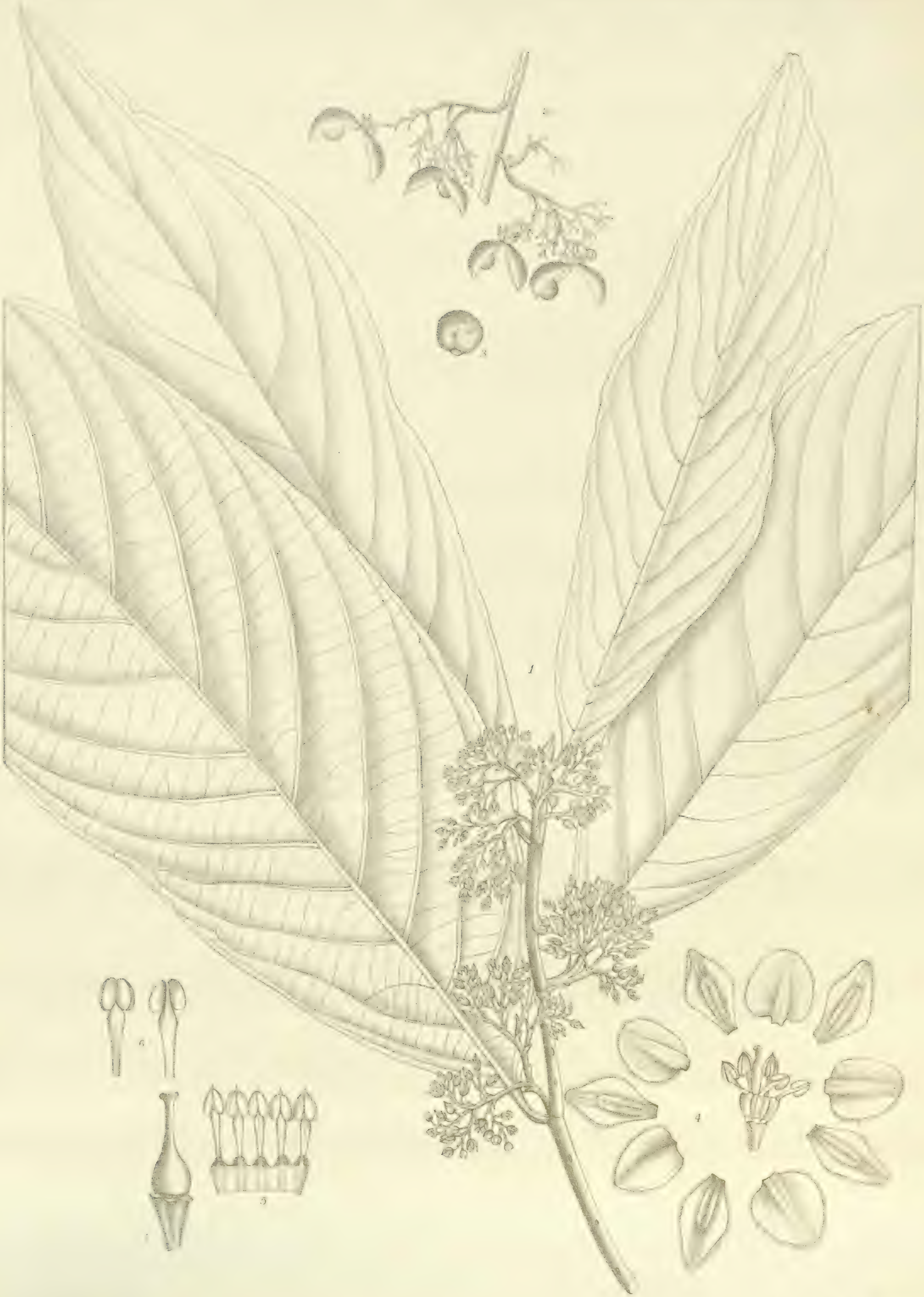
Ann. Roy. Bot. Gard. Calcutta, Vol 5, PLATE 143.



Drawn by A. D. Molla

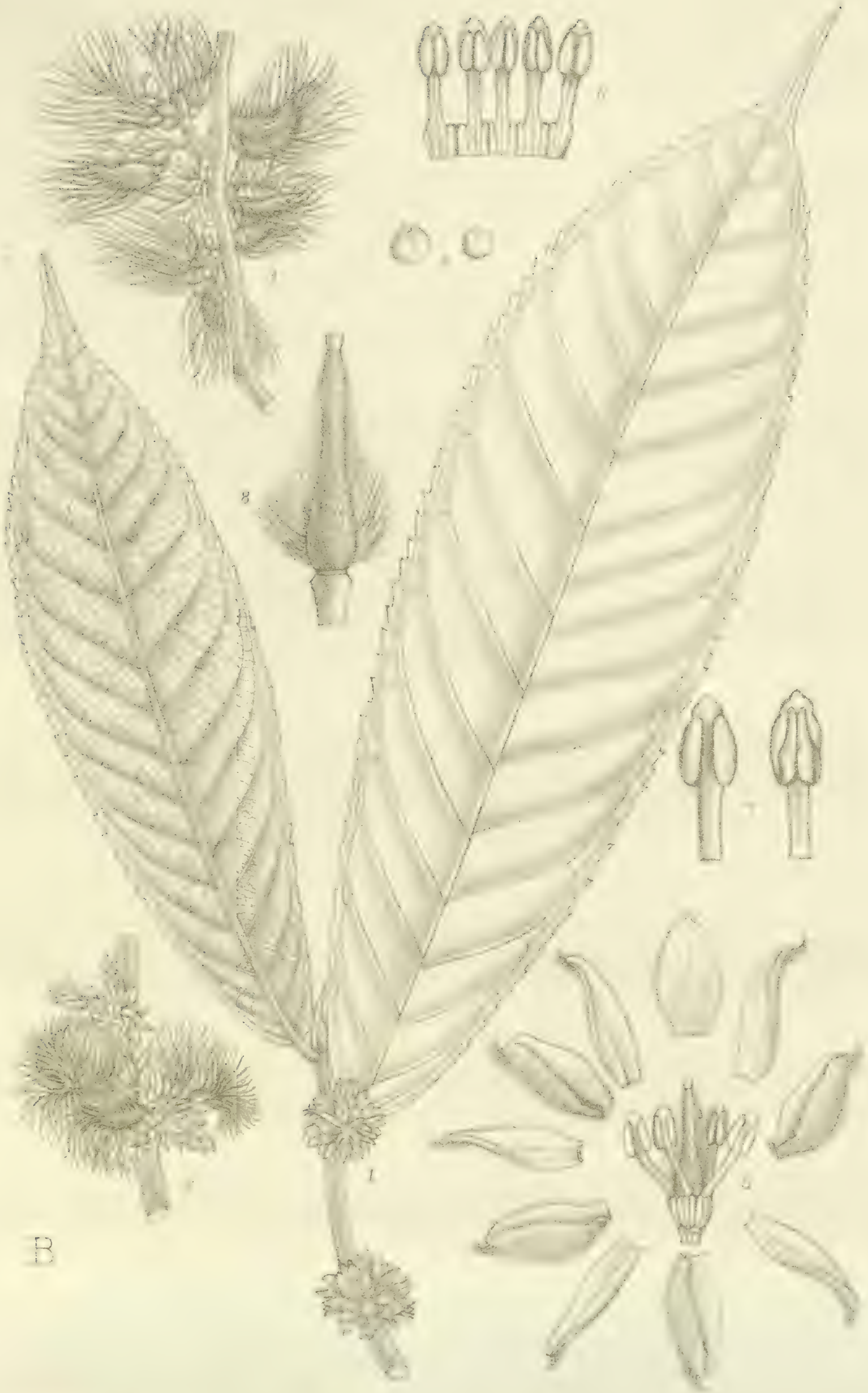
ALSODEIA SCORTECHINII, King.

Lith. by A. D. Molla.



Drawn by G. C. Dass.
Lith. by K. D. Chandra

ALSODEIA CONDENSA, King.



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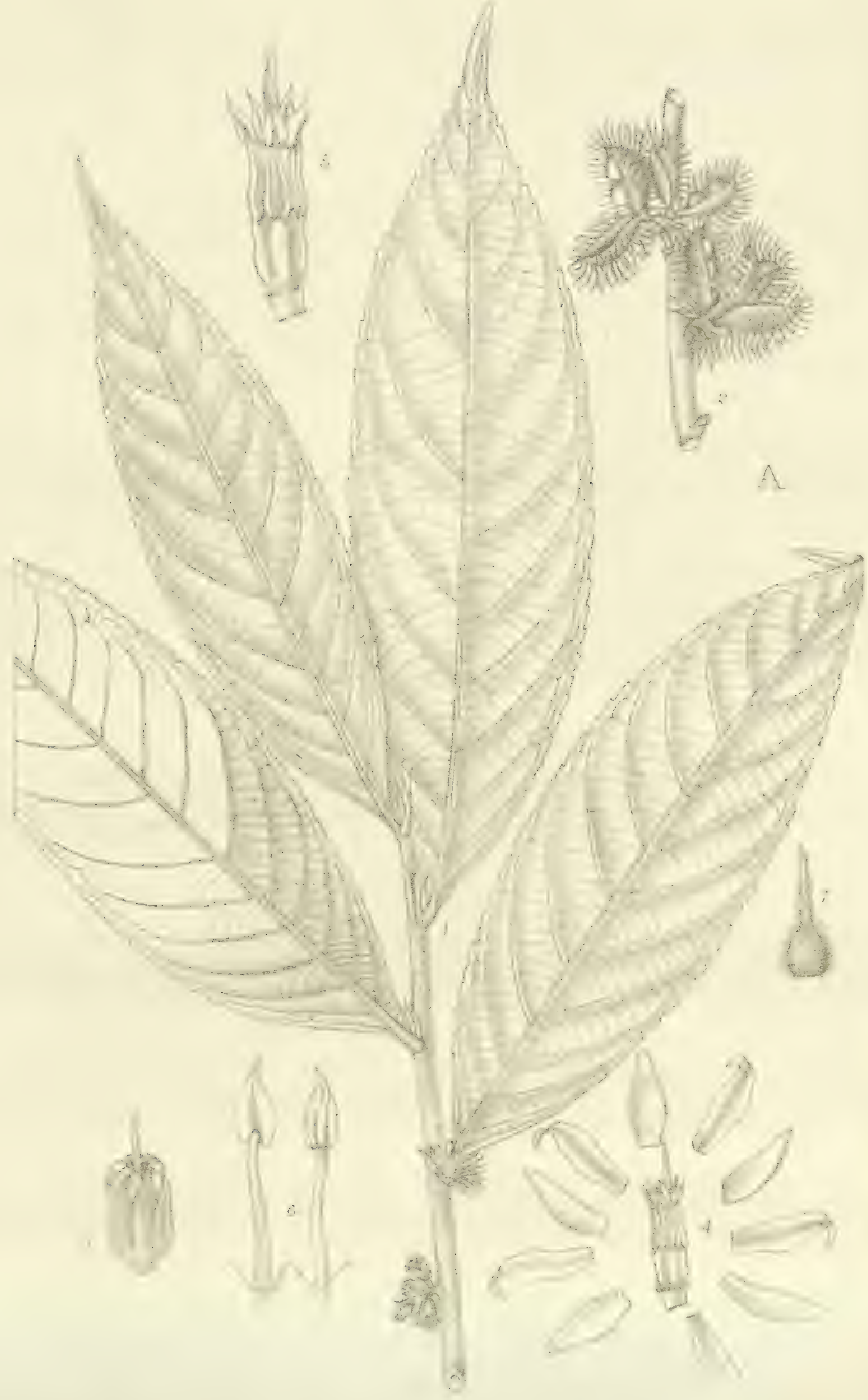
ALSODEIA COMOSA, King.

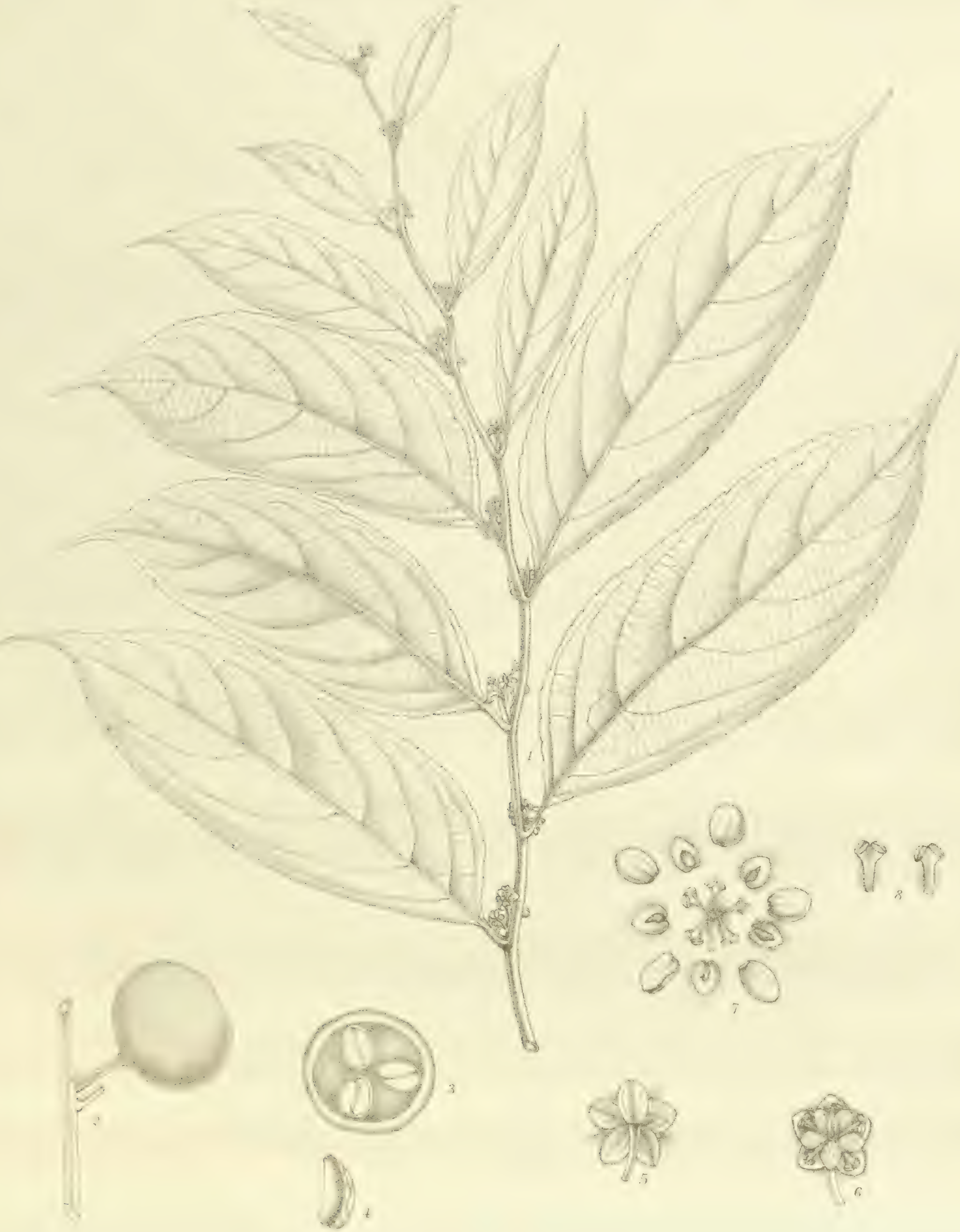


Drawn by A. L. Singh.

ALSODEIA CAPILLATA, King.

Lith by A. C. Singha.

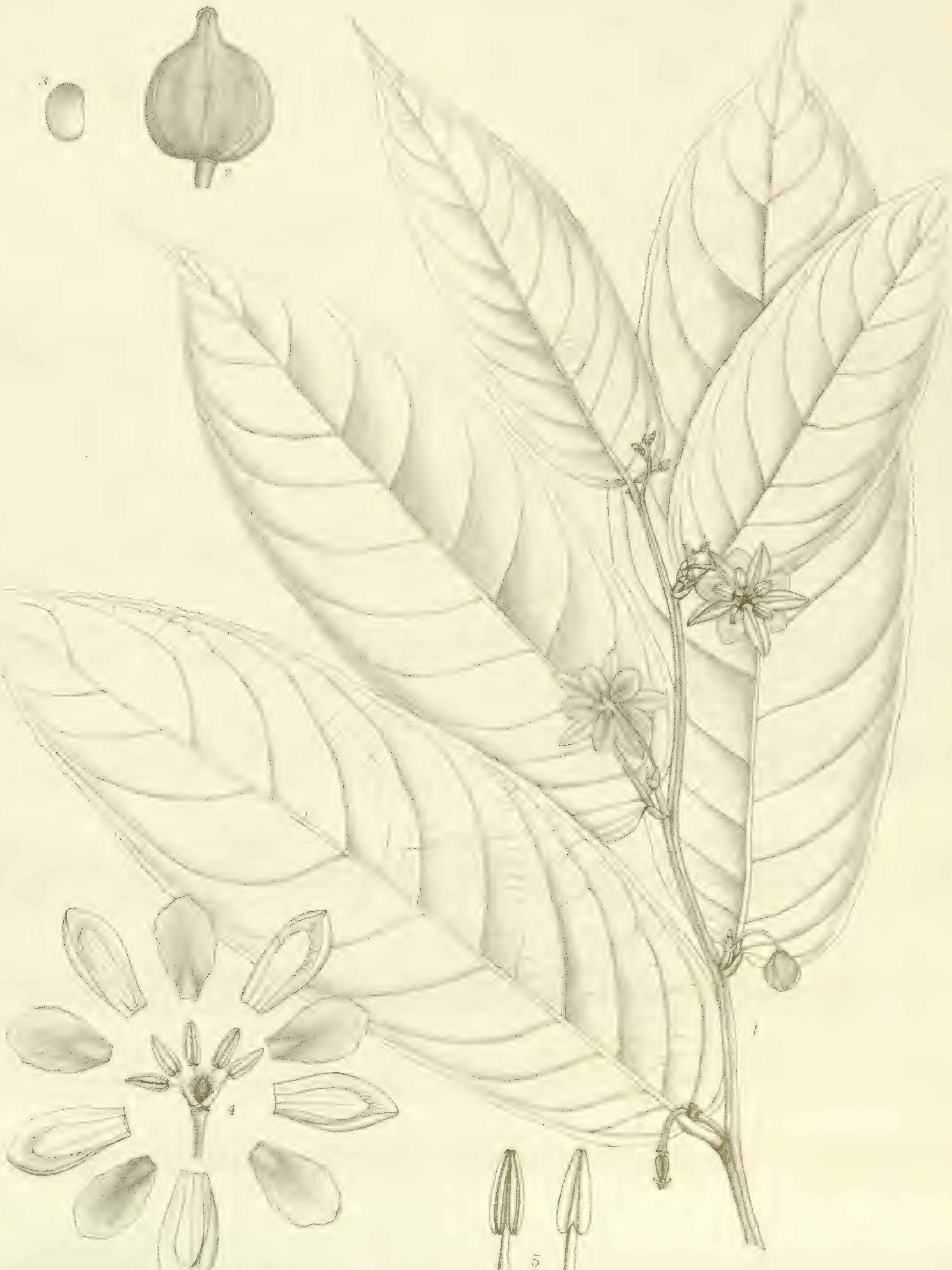
Ann. Roy. Bot. Garden, Calcutta, Vol. 5, PLATE 146.



Drawn by D. M. Chowdhury

Lith by Chitra Silpi Co.

HYDNOCARPUS NANA, King.



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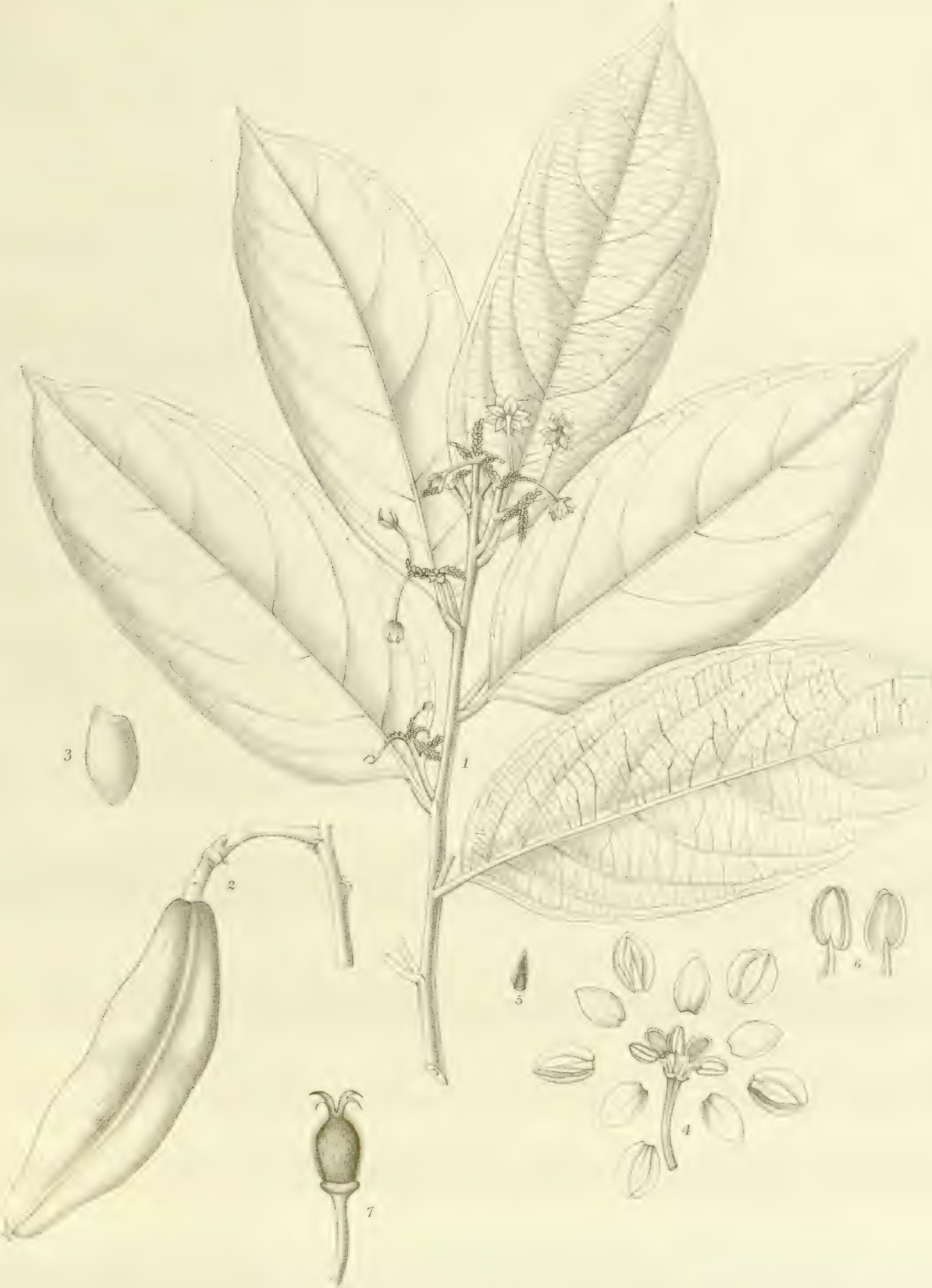
HYDNOCARPUS CURTISII, King.



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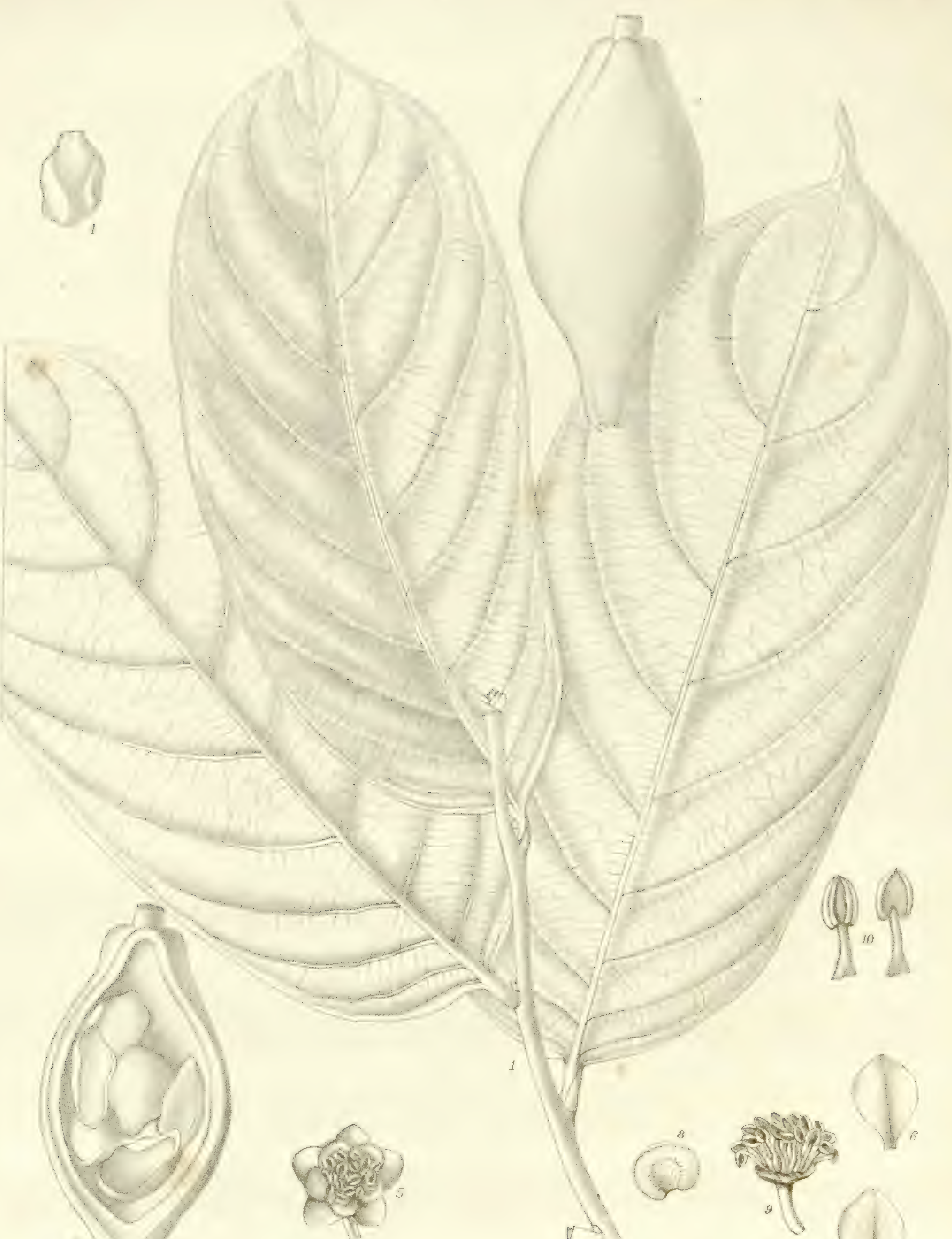
Lith: by K. D. Chandra.

HYDNOCARPUS CUCURBITINA, King.



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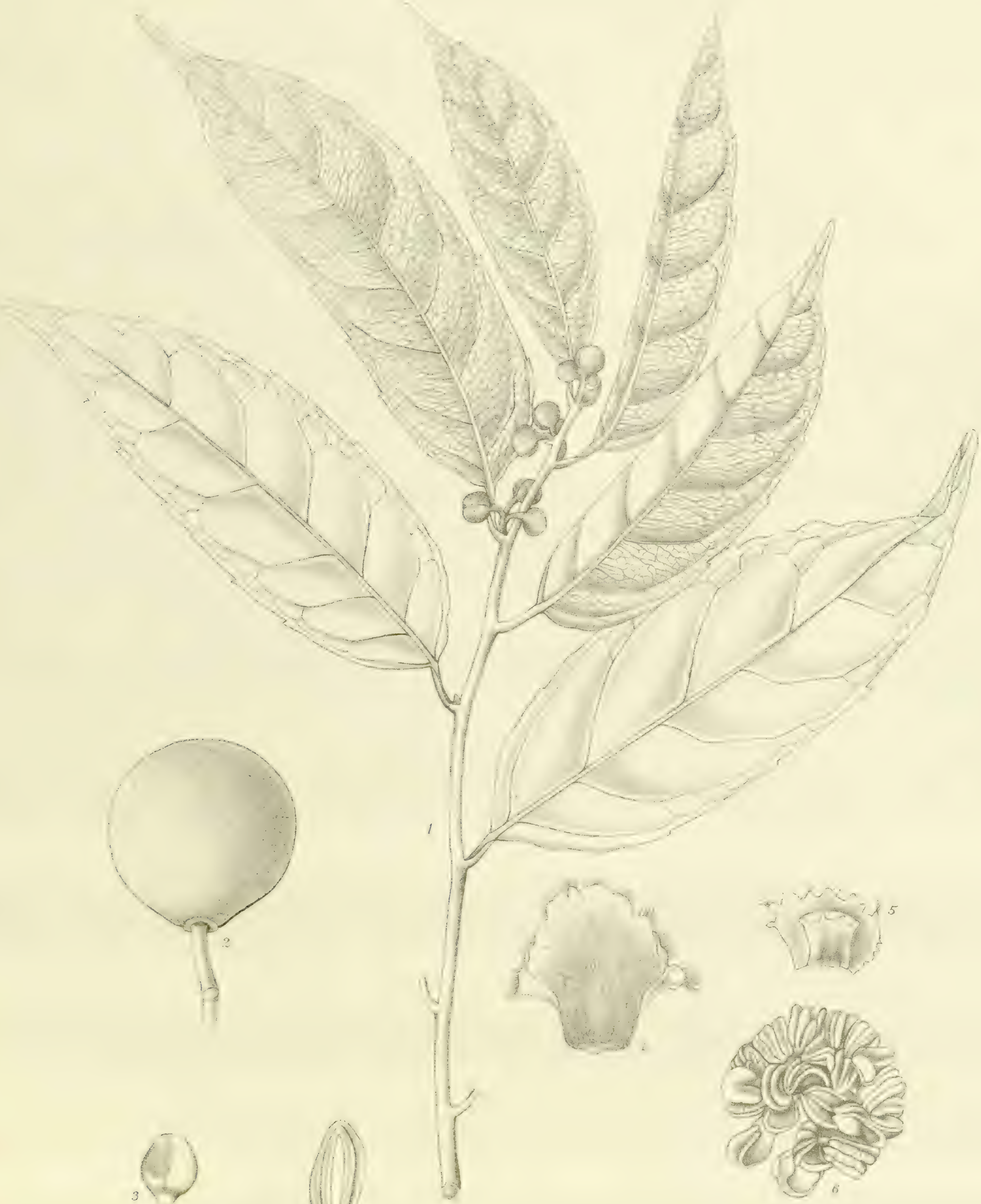
Lith: by Chitra Silpi Co.

HYDNOCARPUS WRAYI, King.



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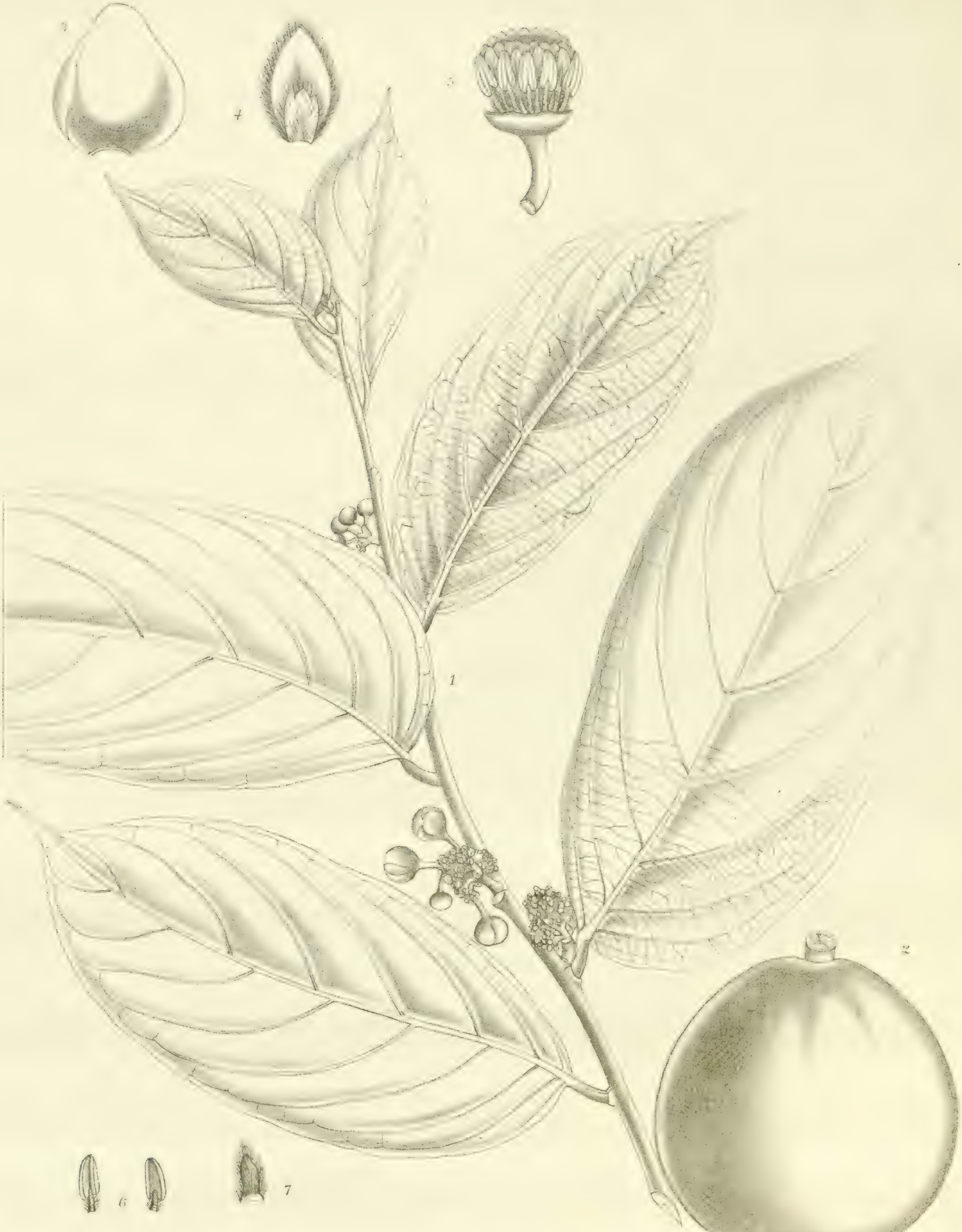
Lith: by K.P. Dass.

HYDNOCARPUS ILICIFOLIA, King.



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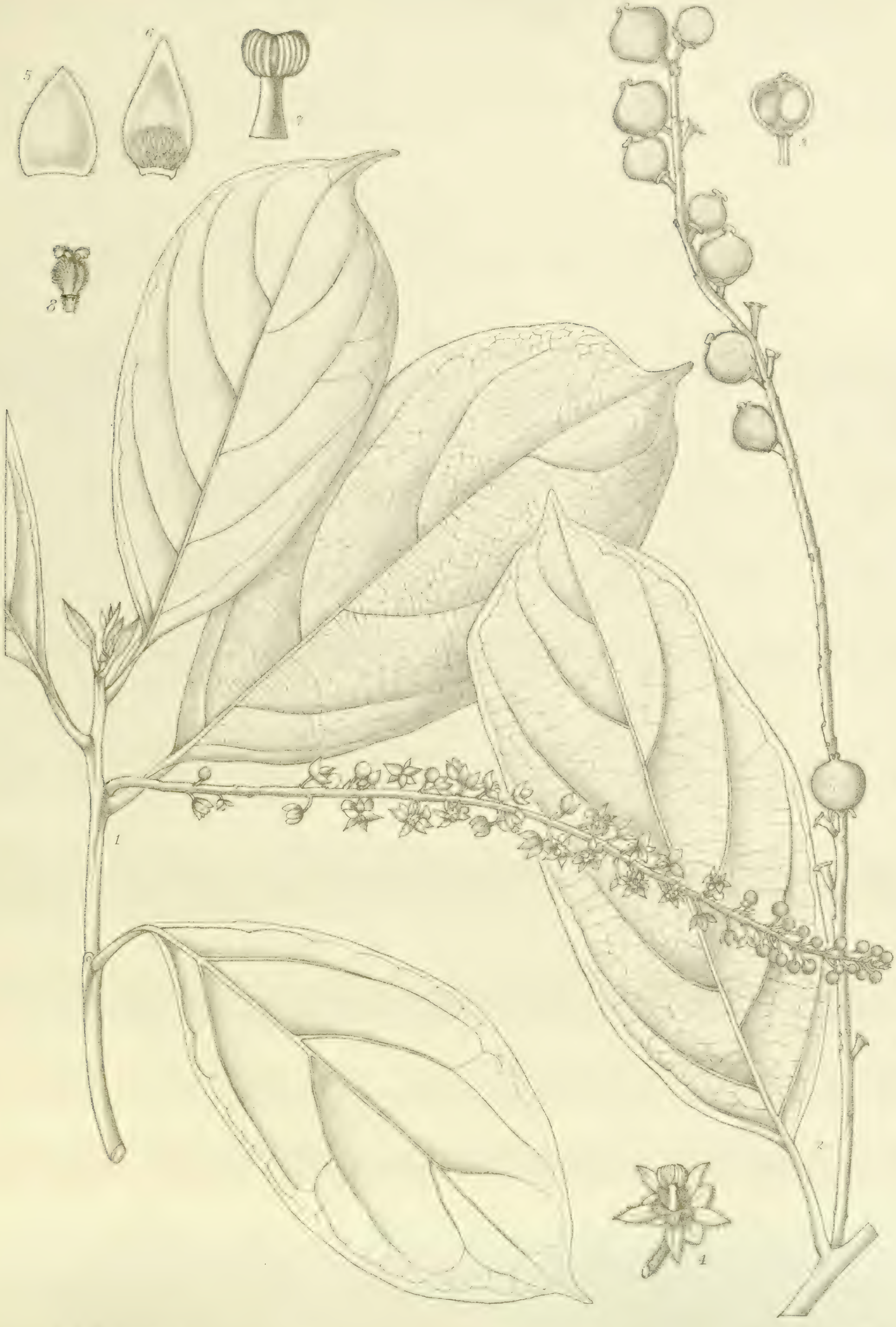
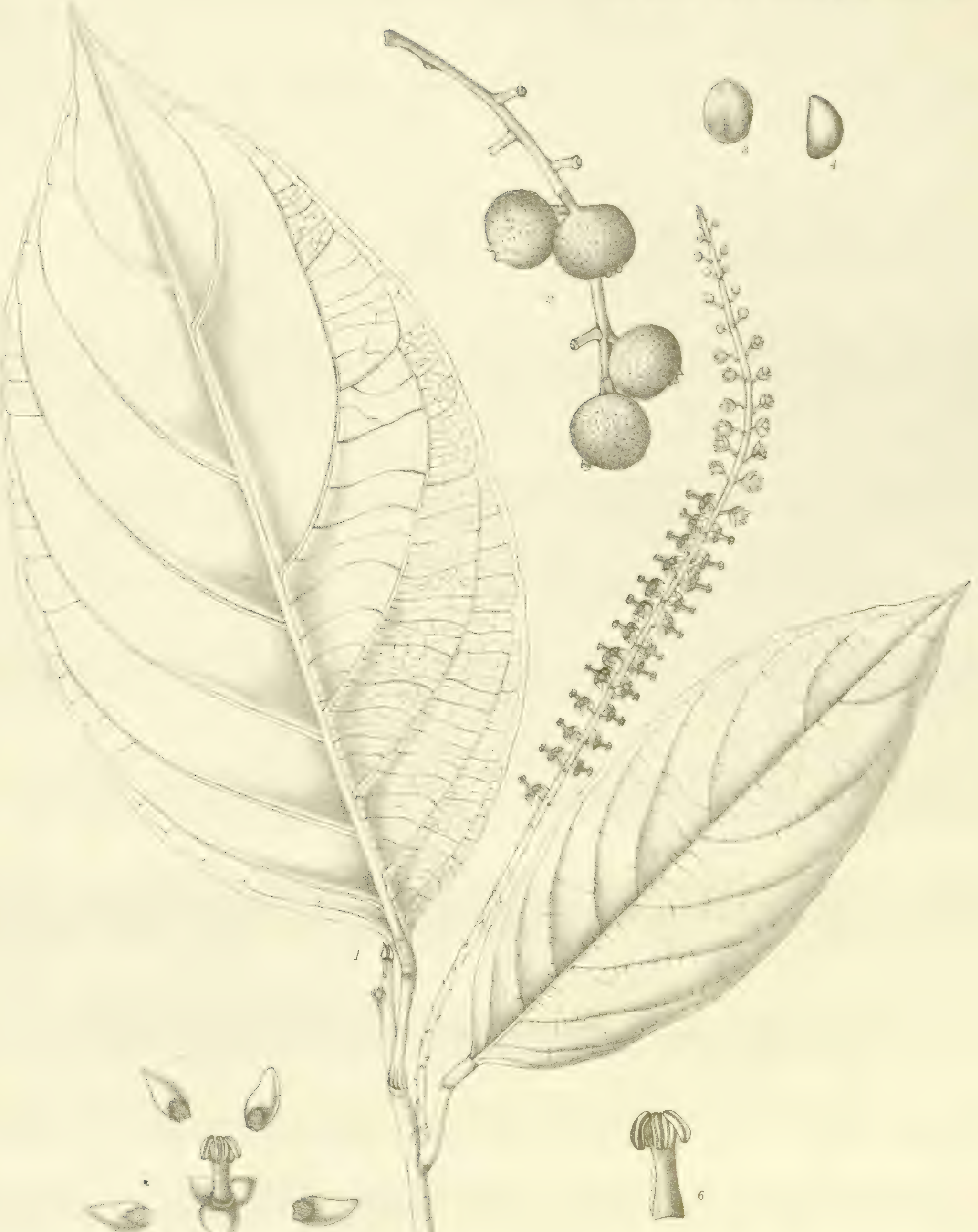
Lith. by K.D. Chandra.

TARAKTOGENOS KUNSTLERI, King.



Drawn by D. N. Chawdhury. Lith: by Chitra Silpi C°.

RYPAROSA CAESIA, Blume.



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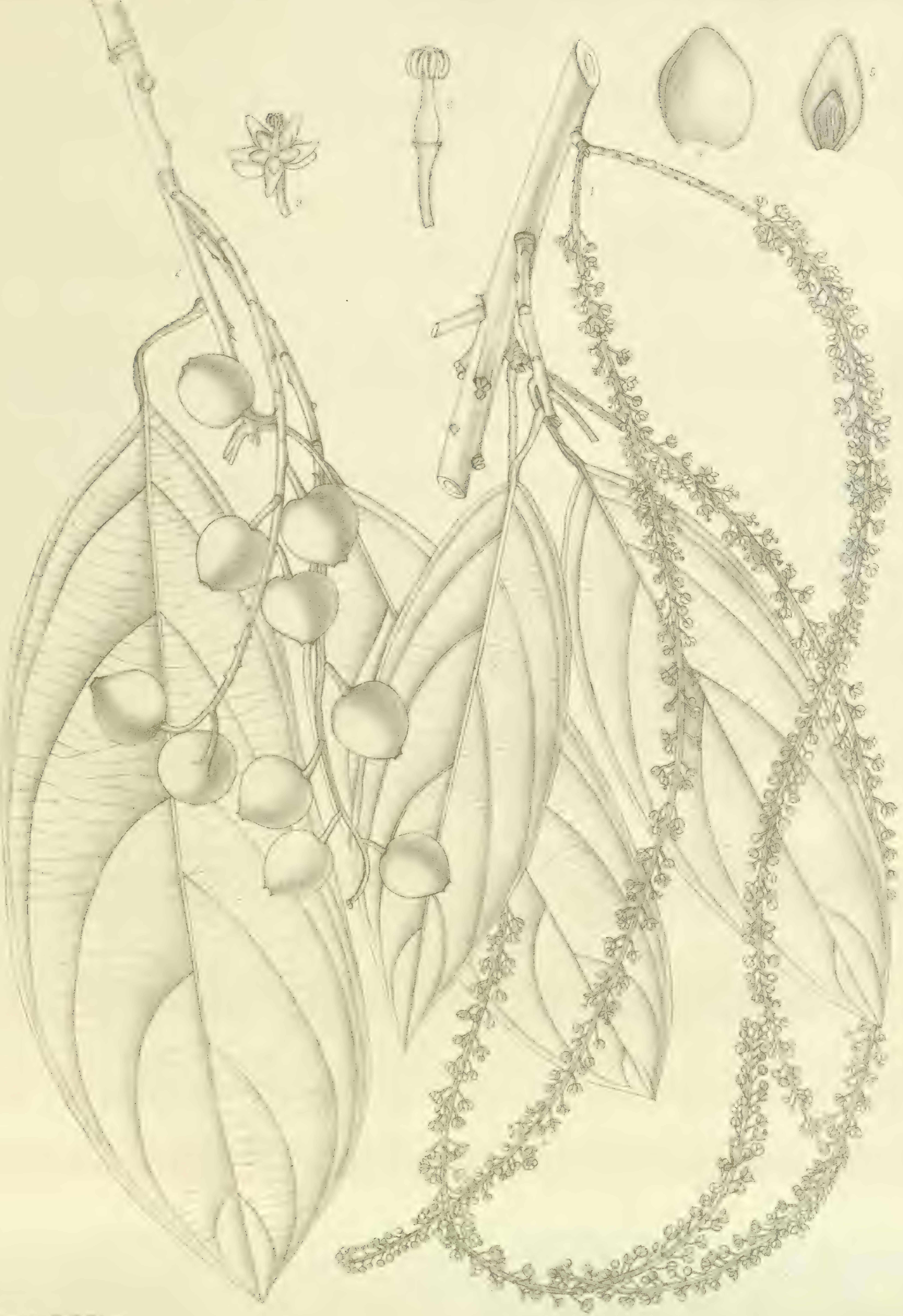
Lith: by P. N. Sinha.

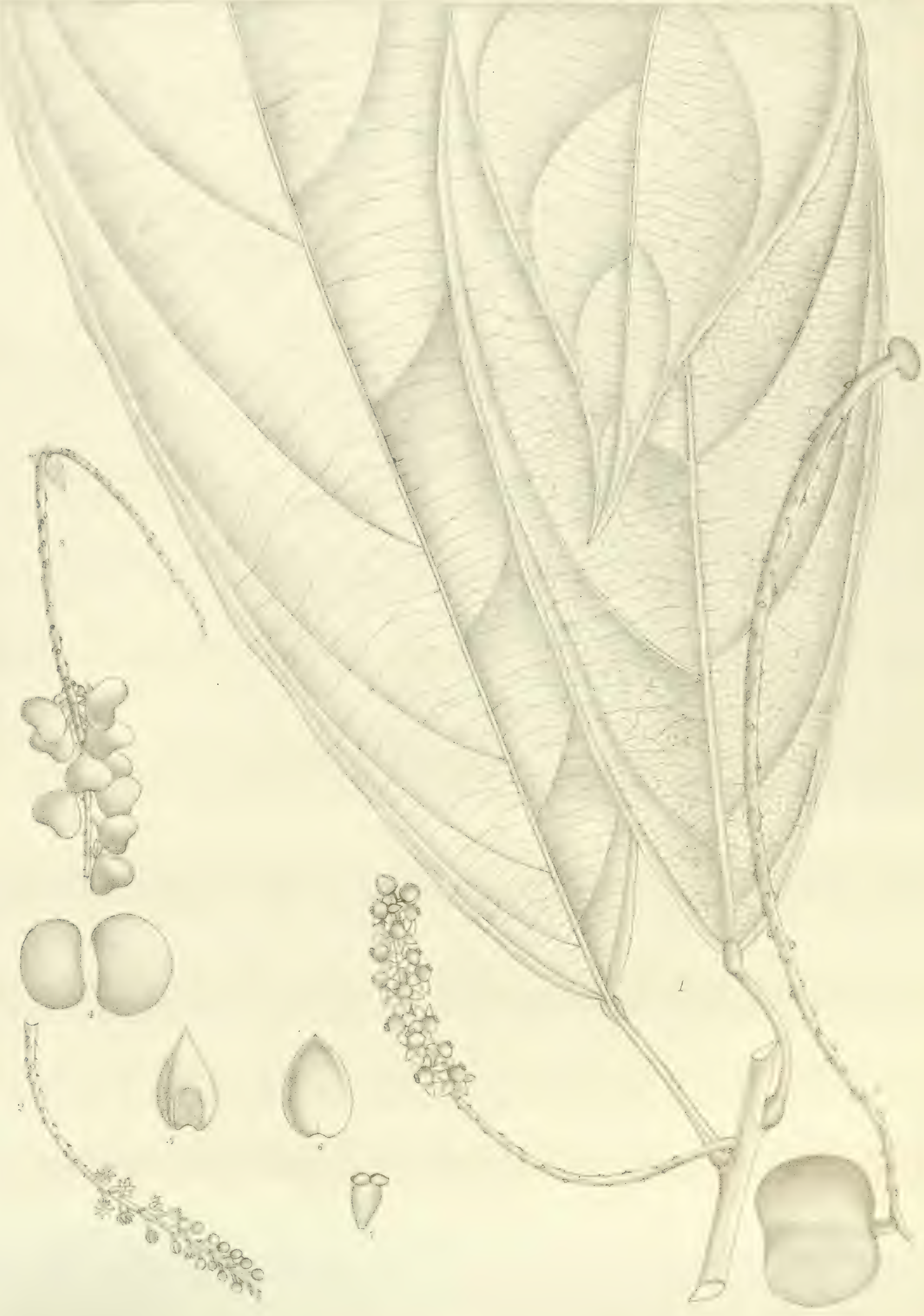
RYPAROSA KURZII, King.



Drawn by G. C. Dass

Lith. by A. C. Mukerjei

RYPAROSA WRAYI, King.



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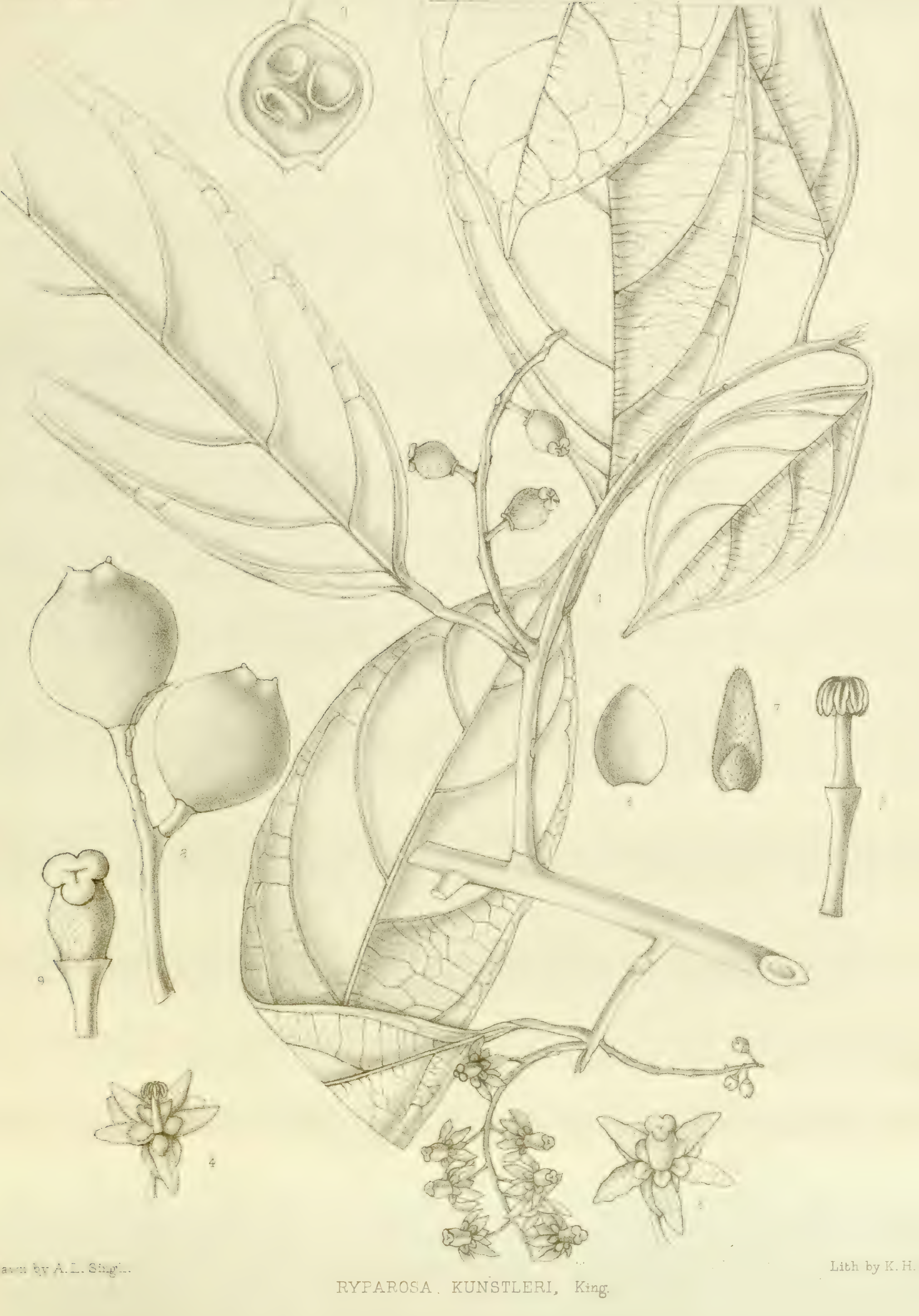
RYPAROSA SCORTECHINII, King.

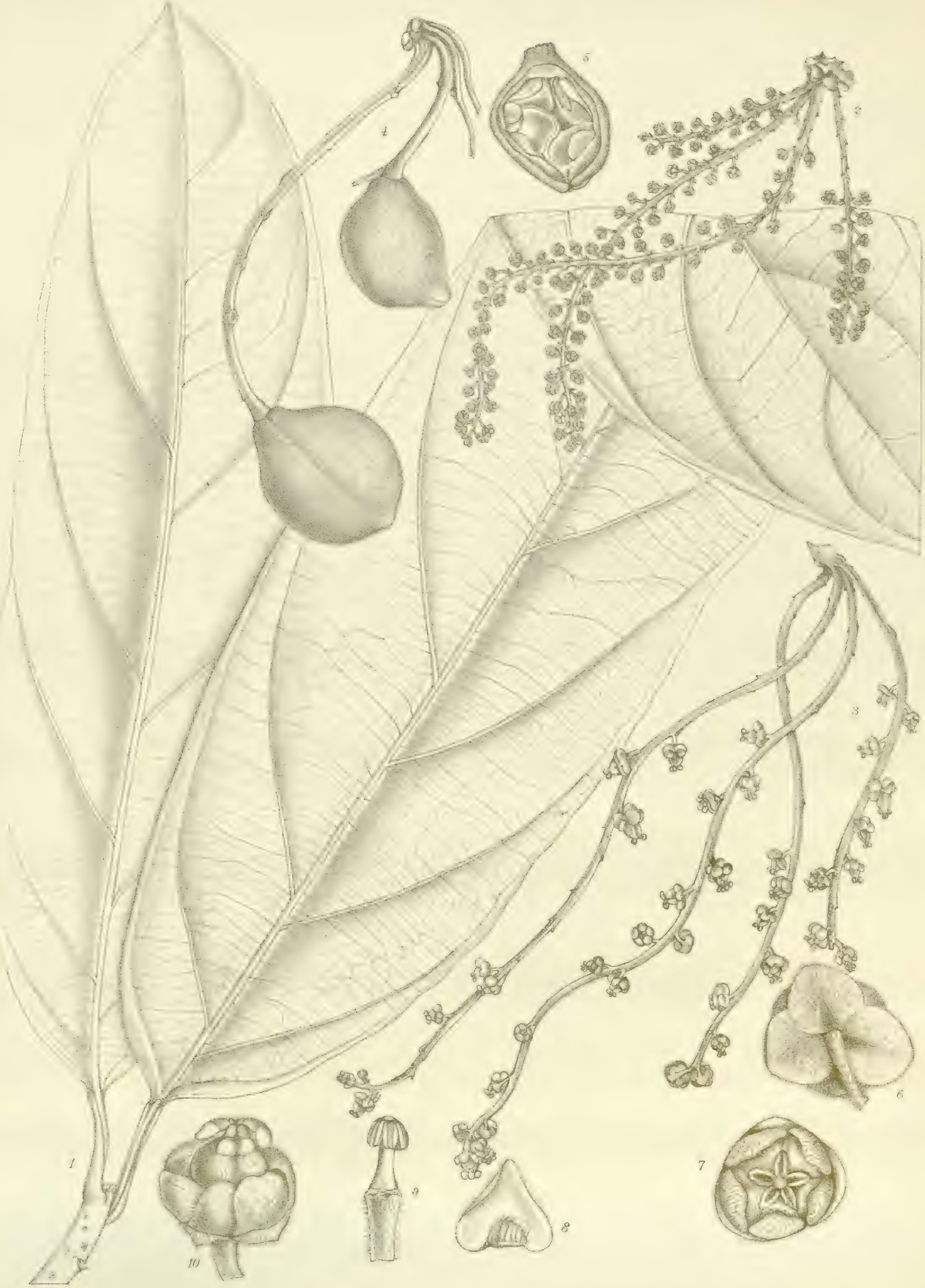
Lith. by [illegible]



Drawn by A. L. Singh.

Lith by K. H. Das.

RYPAROSA KUNSTLERI, King.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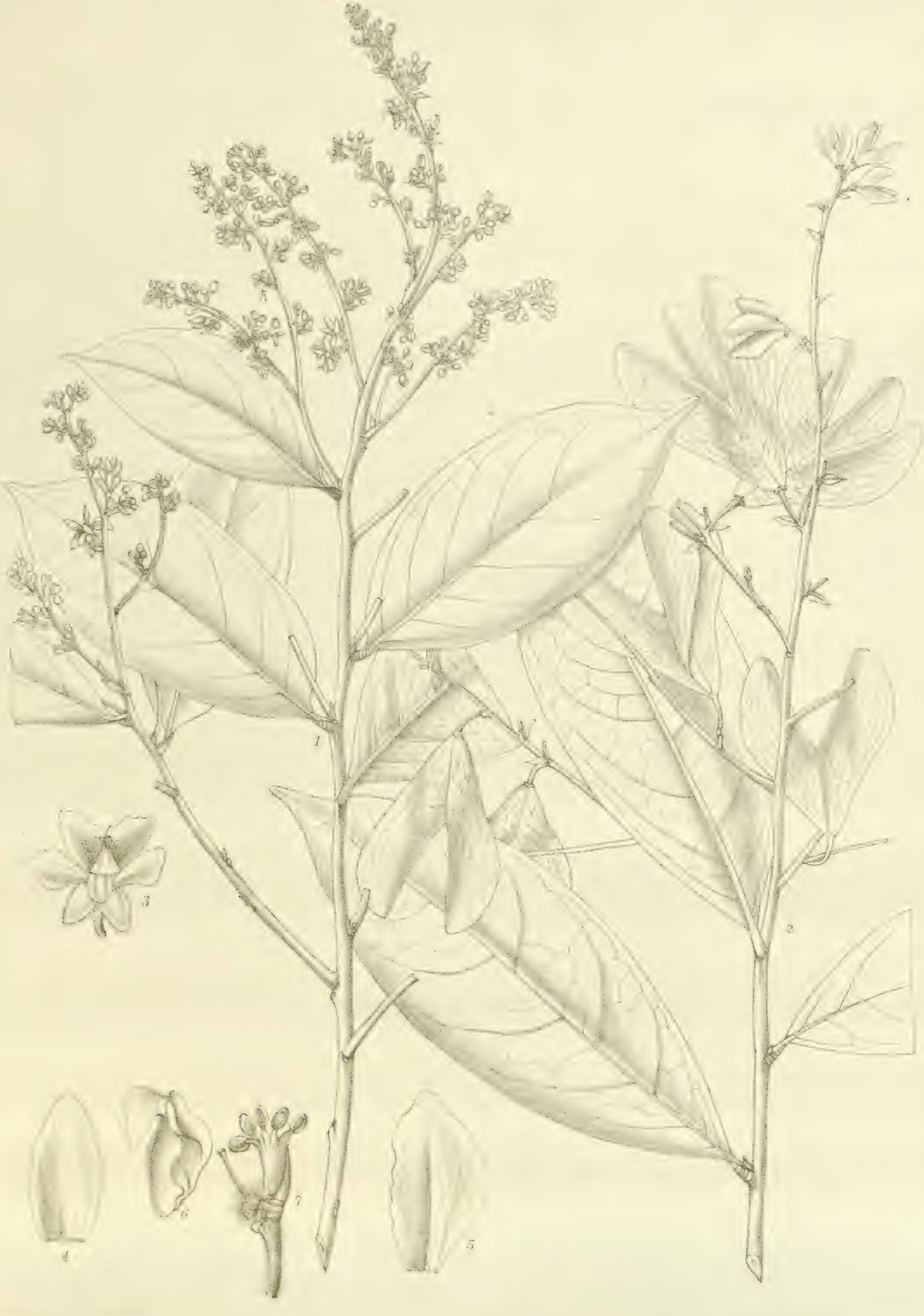
Drawn by G. C. Dass.

Lith: by Chitra Silpi Co.

RYPAROSA FASCICULATA, King



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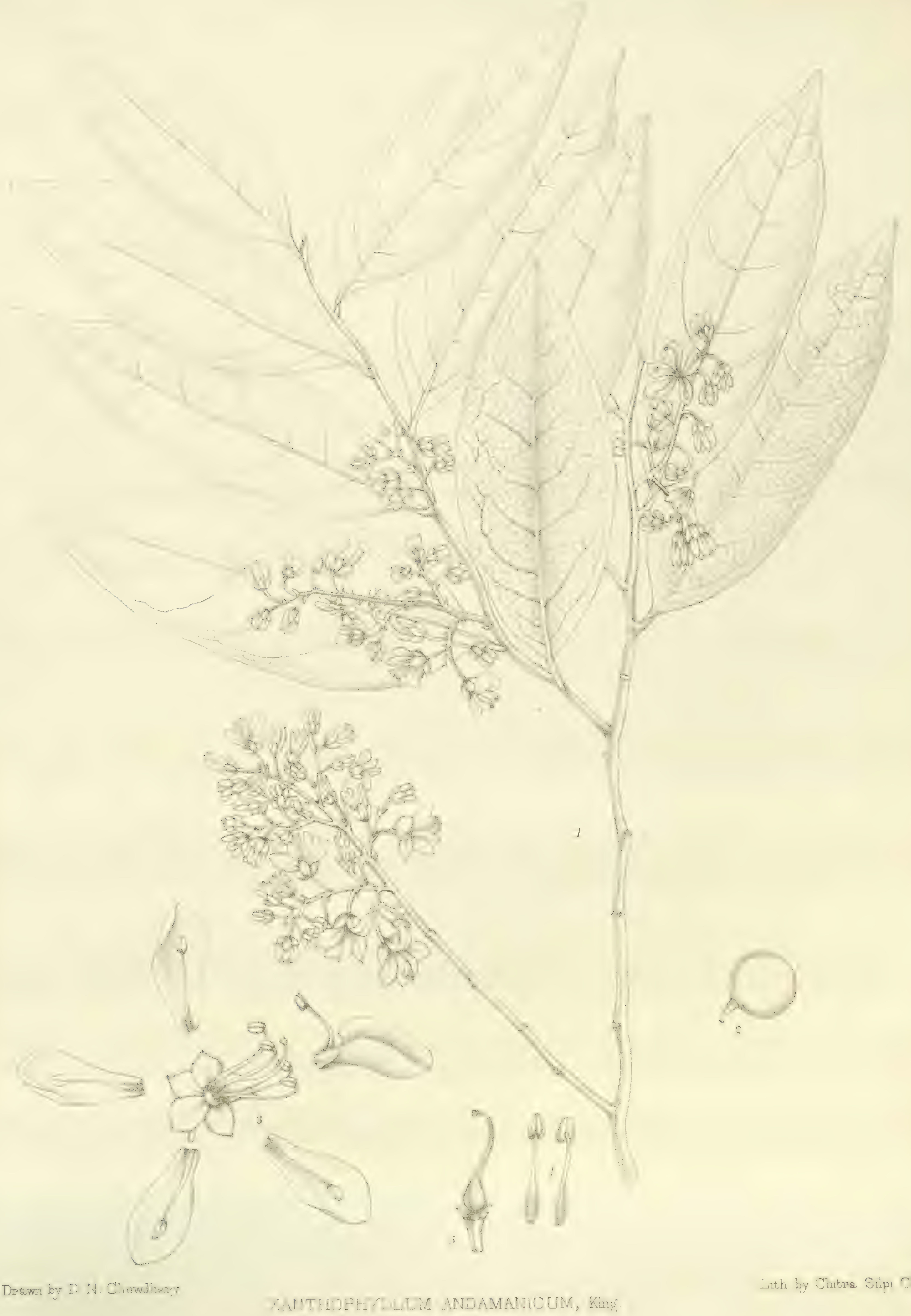
Lith. by Chitra Silpi Co.

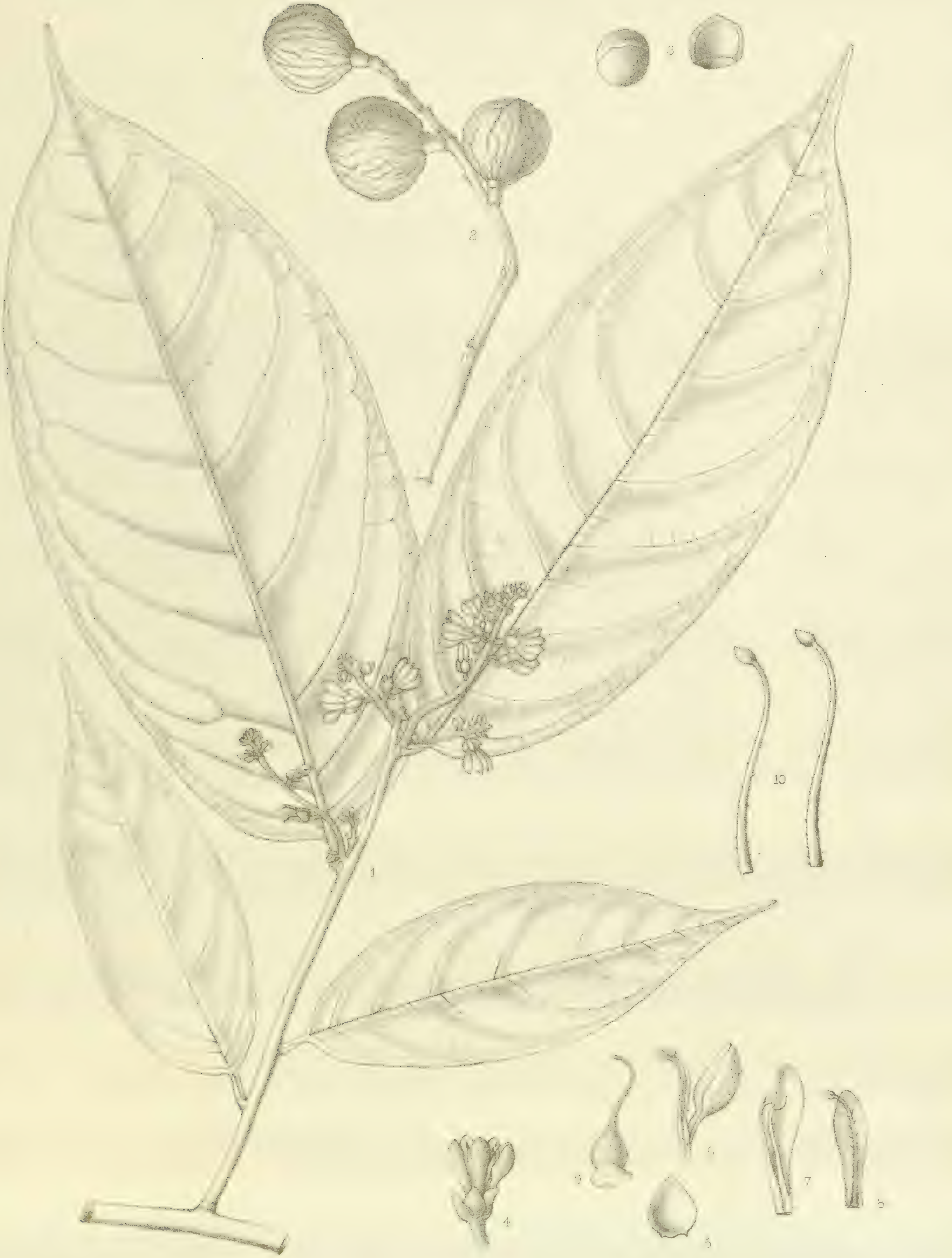
TRIGONIASTRUM HYPOLEUCUM, Miq.



Drawn by D. N. Chowdhary

Lith by Chitra Silpi Co

XANTHOPHYLLUM ANDAMANICUM, King.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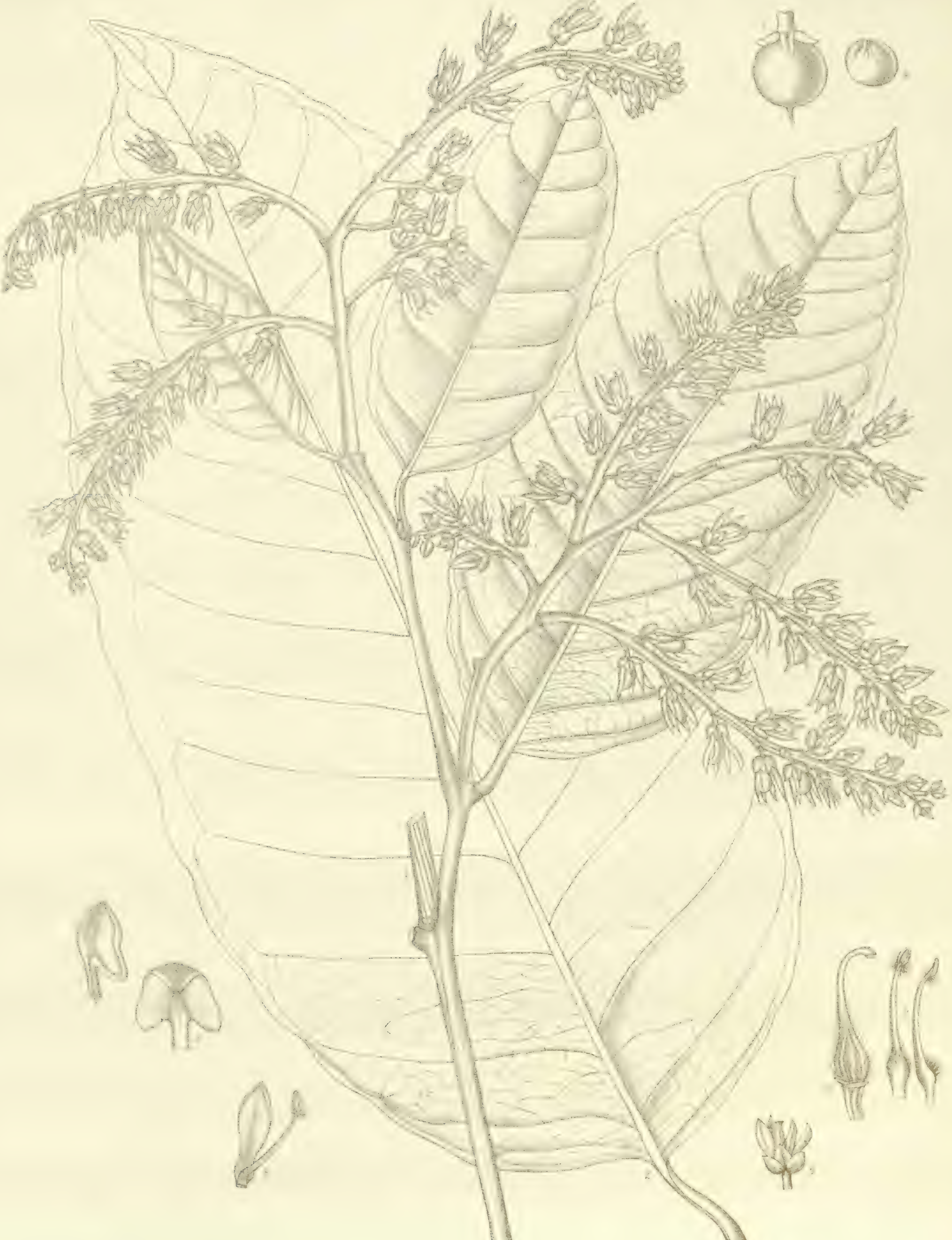
Drawn by A. L. Singh.

Lith by K. H. Das.

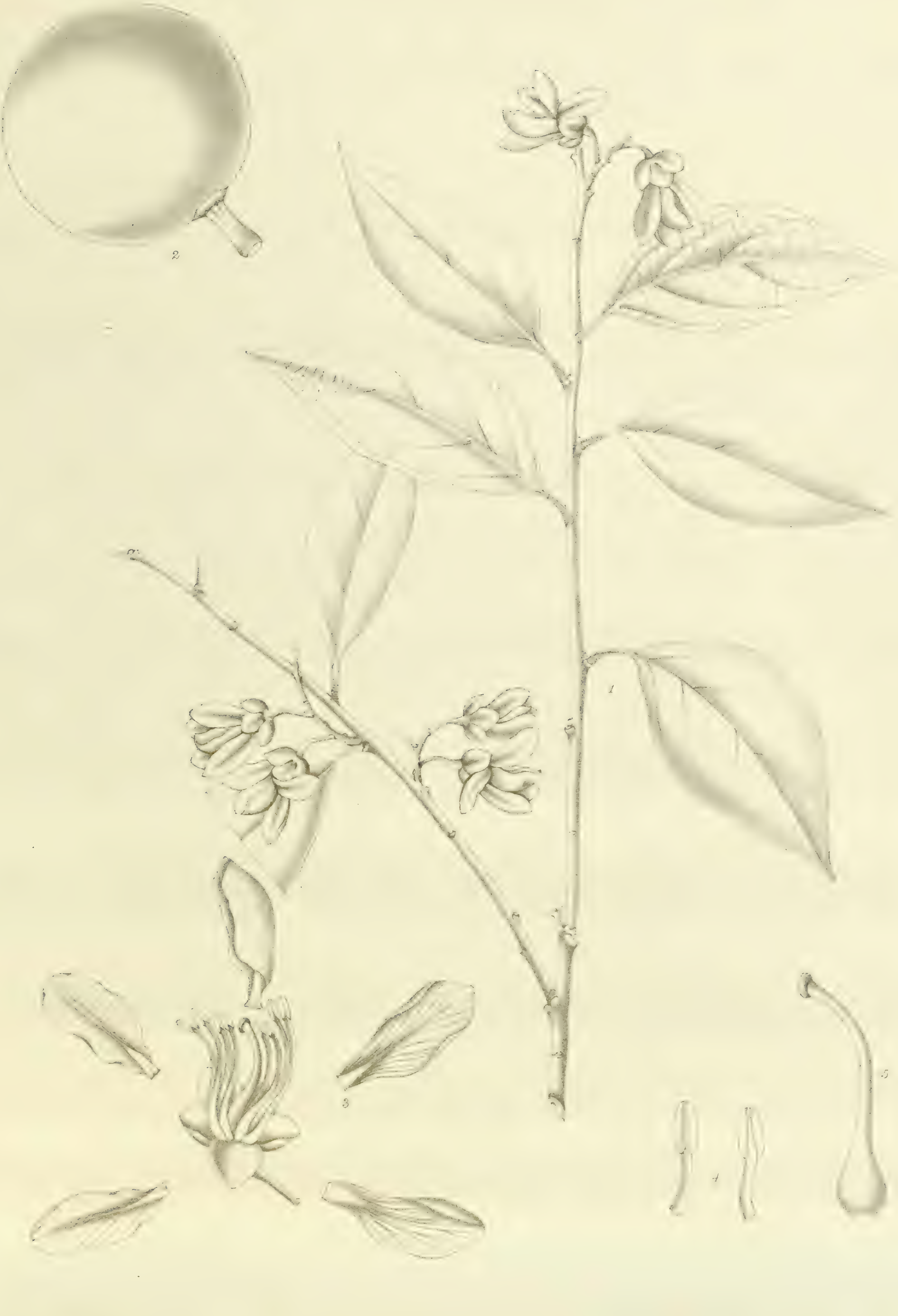
XANTHOPHYLLUM WRAYI, King.



Drawn by G. C. Dass.

Lith. by A. C. Mukerjei

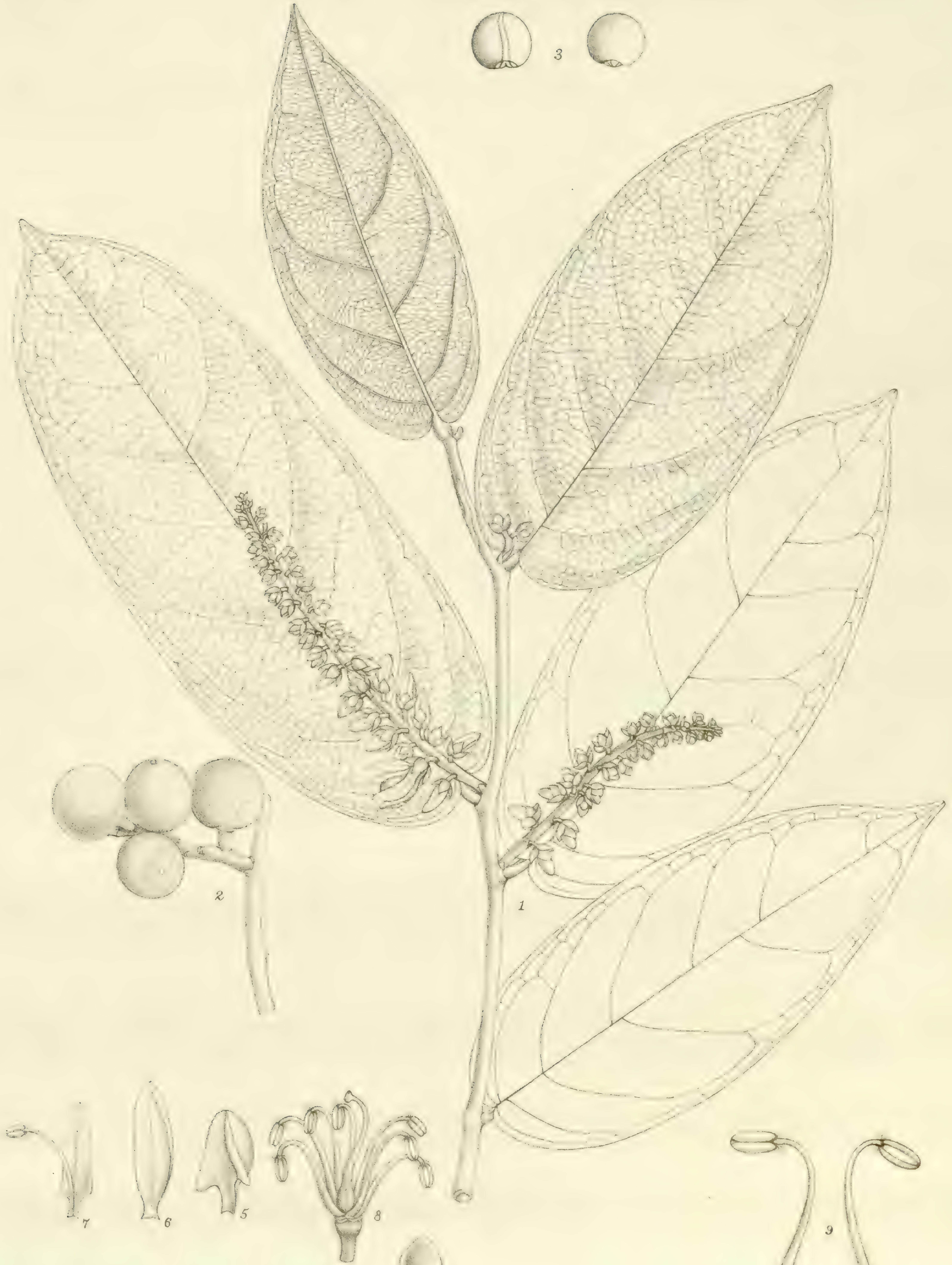
XANTHOPHYLLUM KUNSTLERI, King.



[illegible] by A. D. [illegible]

Lith. by A. L. Singh.

XANTHOPHYLLUM SCORTECHINII, King.



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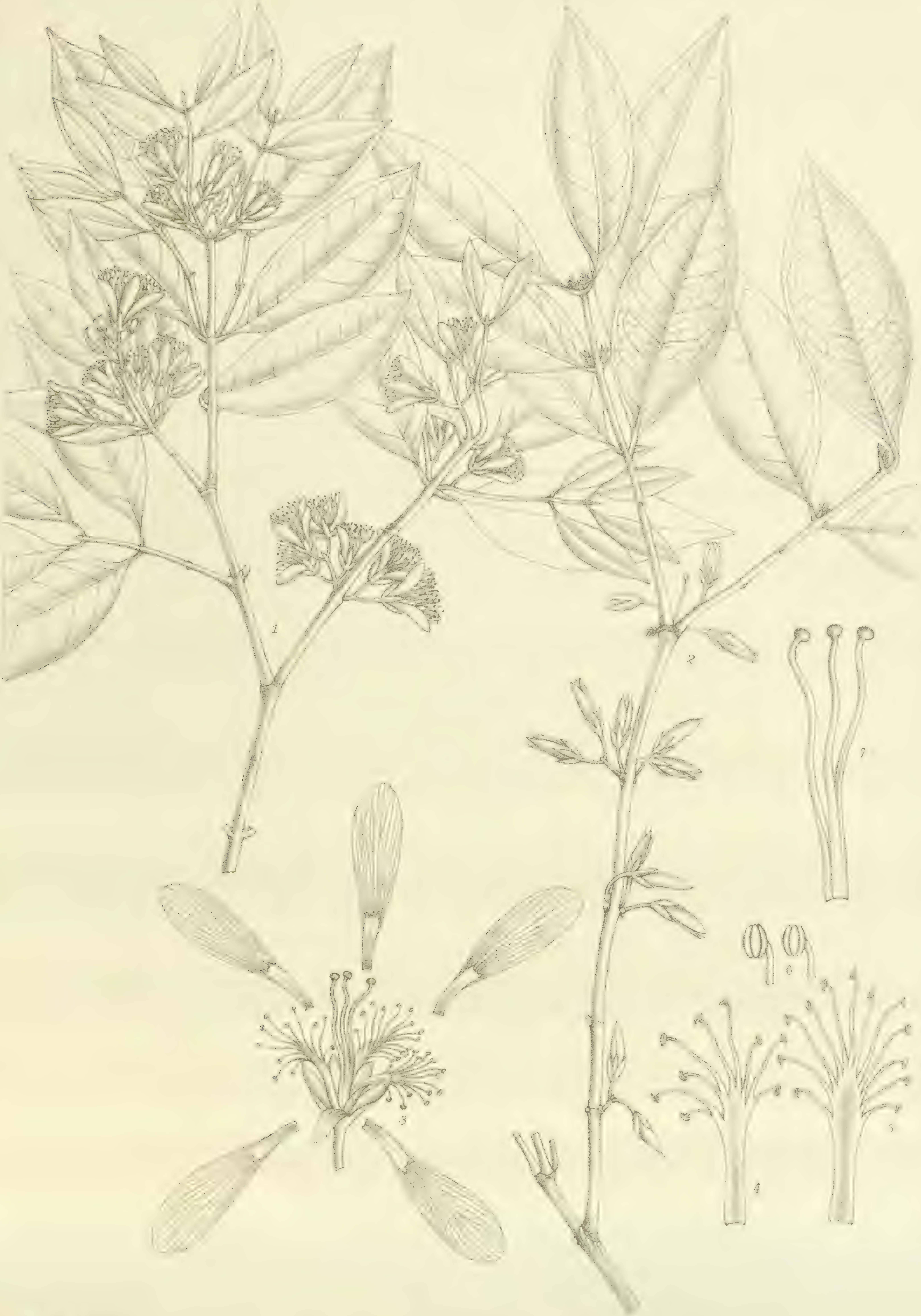
Lith: by A.C. Singha.

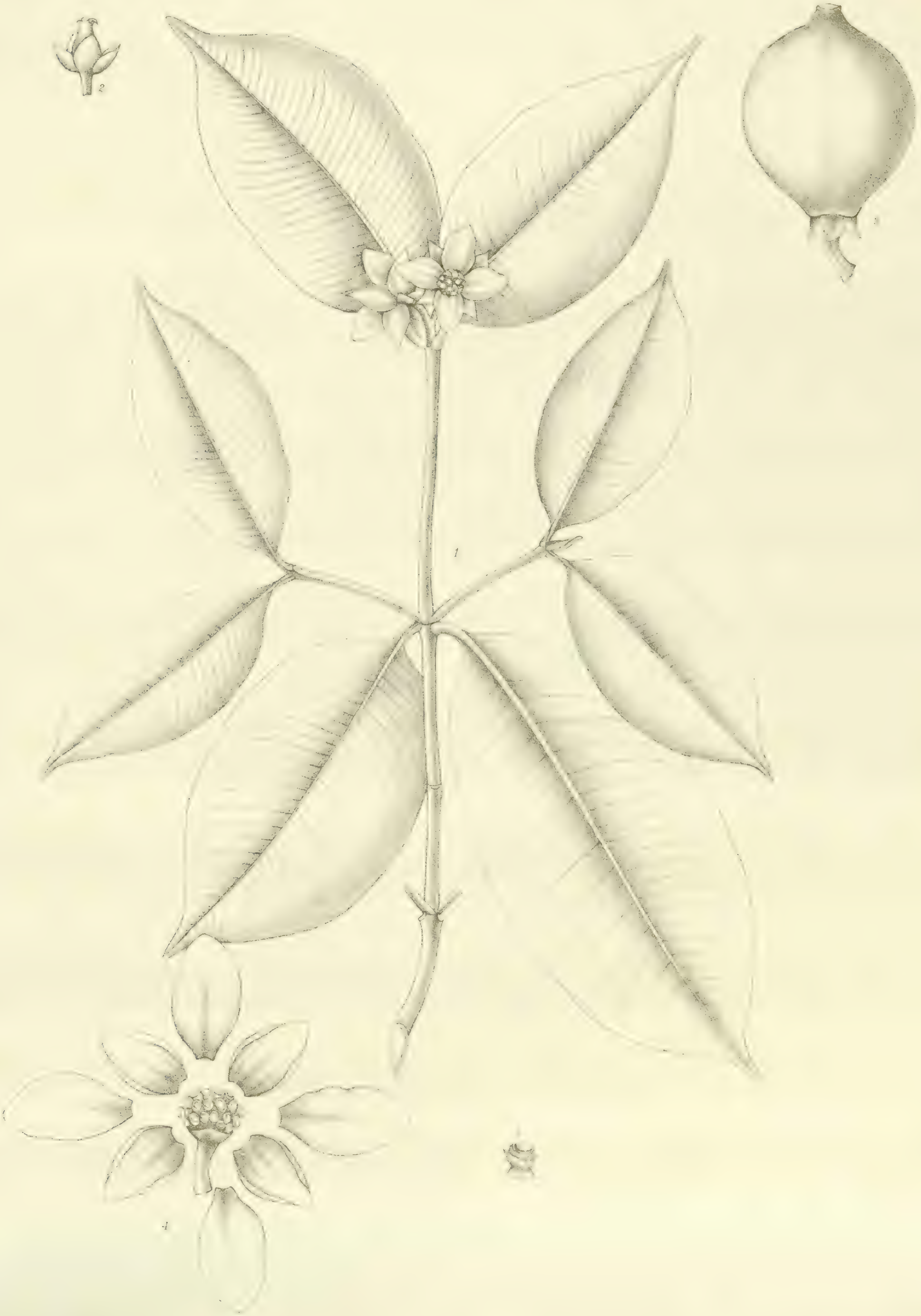
XANTHOPHYLLUM PULCHRUM, King.



Drawn by [illegible]

Lith: by A. L. Singh.

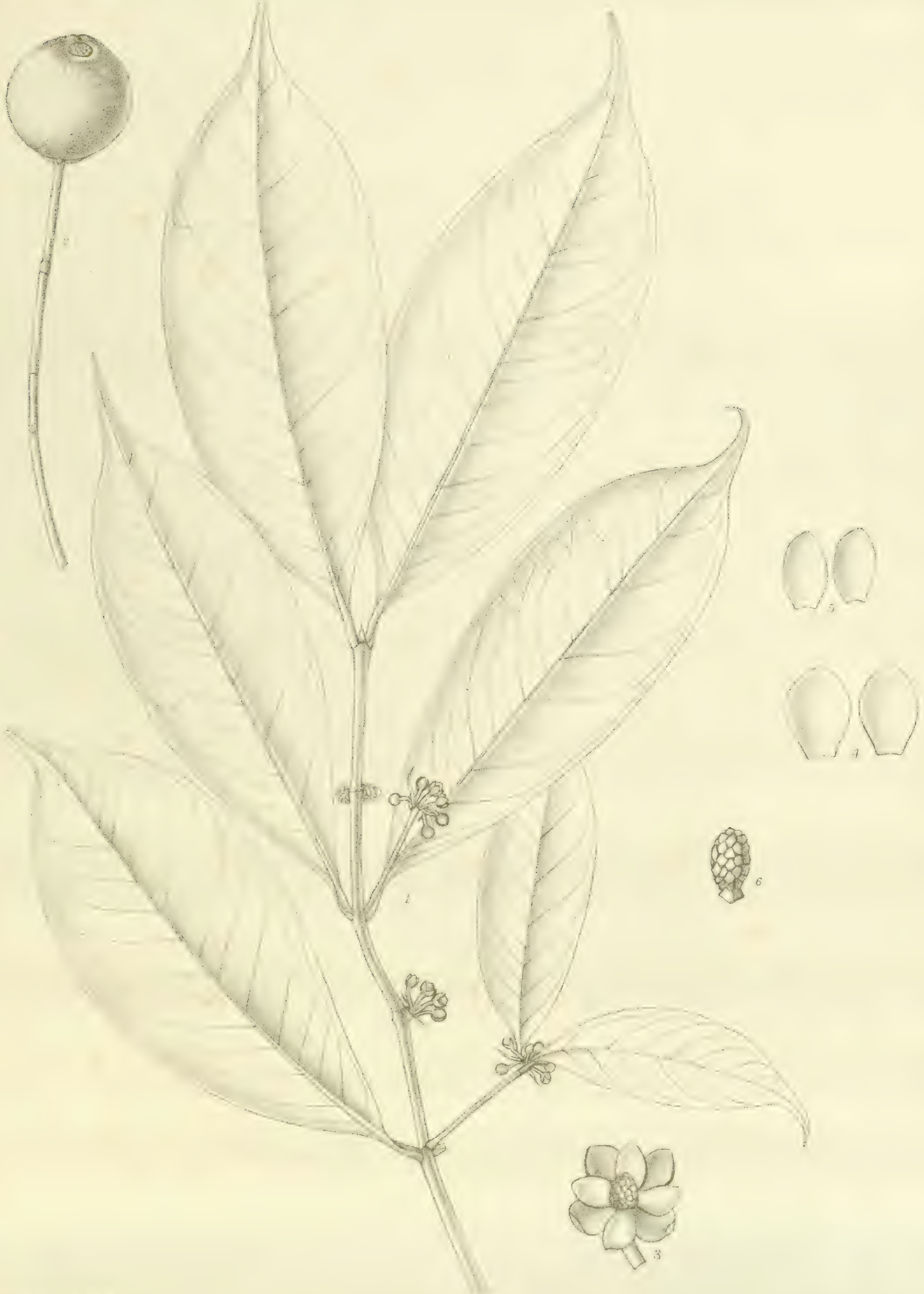
CRATOXYLON MAINGAYI, Dyer.



Drawn by A. D. Molla.

GARCINIA OPACA, King.

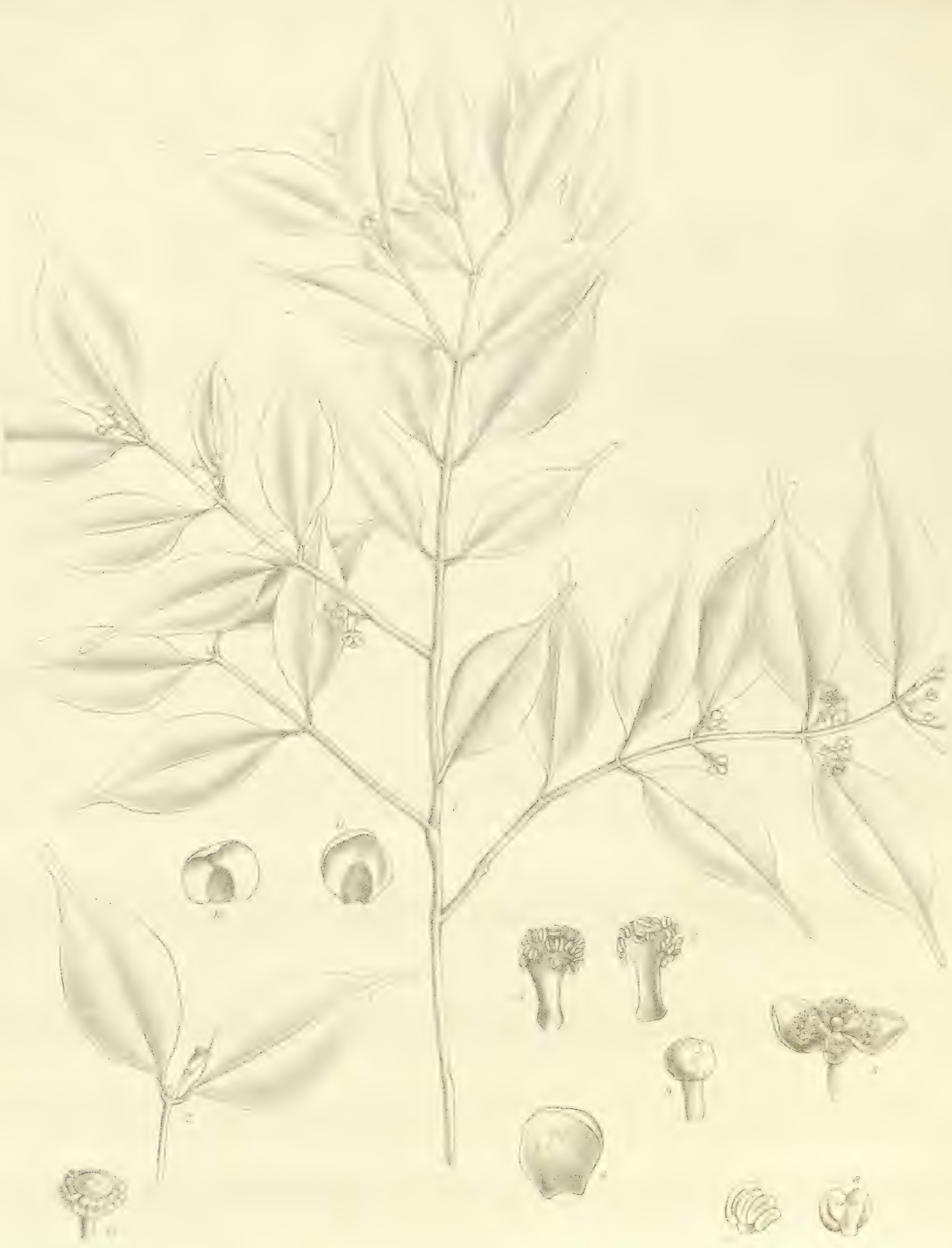
Lith. by K. P. Dass.



Drawn by A. D. Molla.

GARCINIA KUNSTLERI, King.

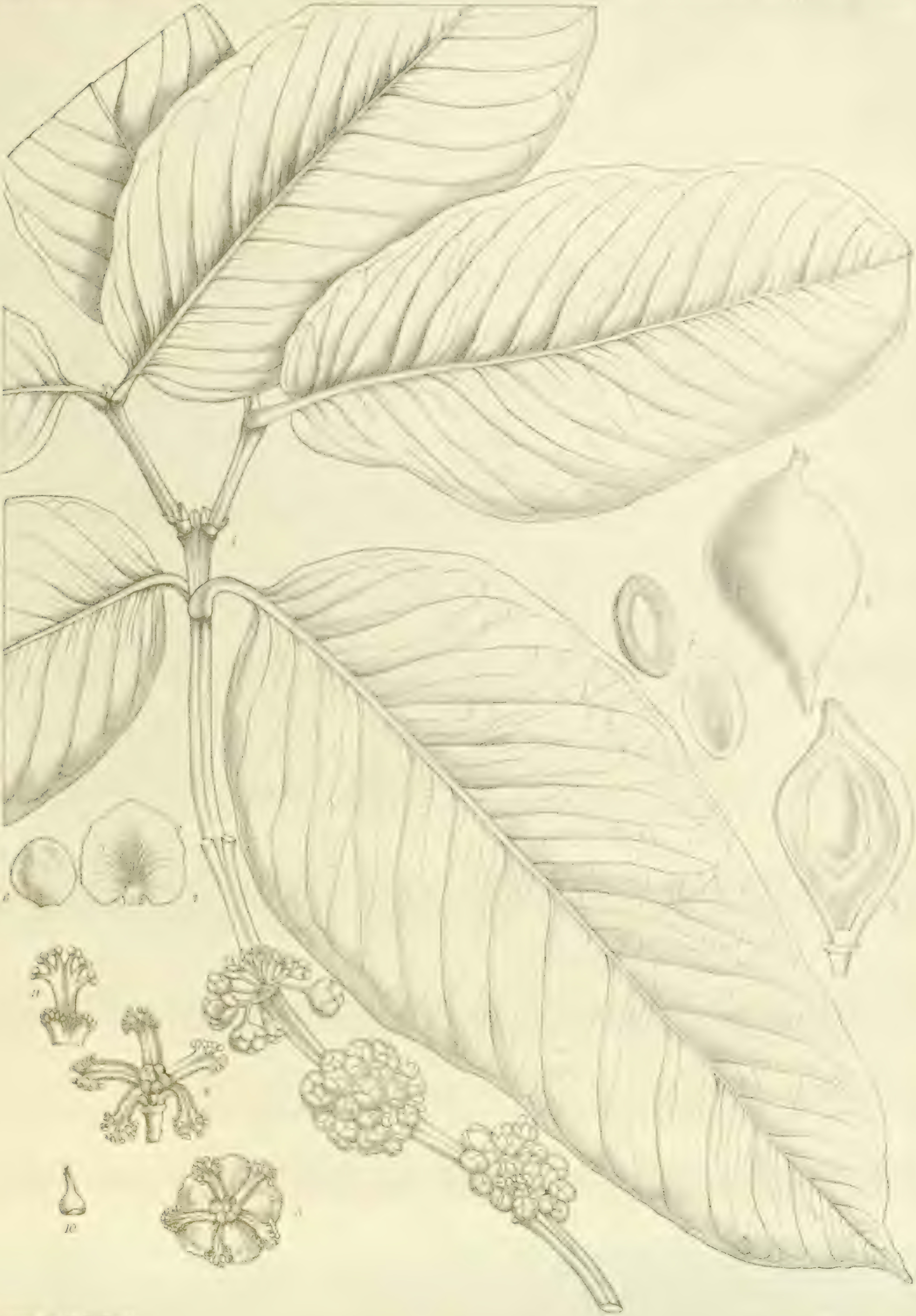
Lith by A. D. Molla.



Drawn by K. P. Dass.

GARCINIA WRAYI, King.

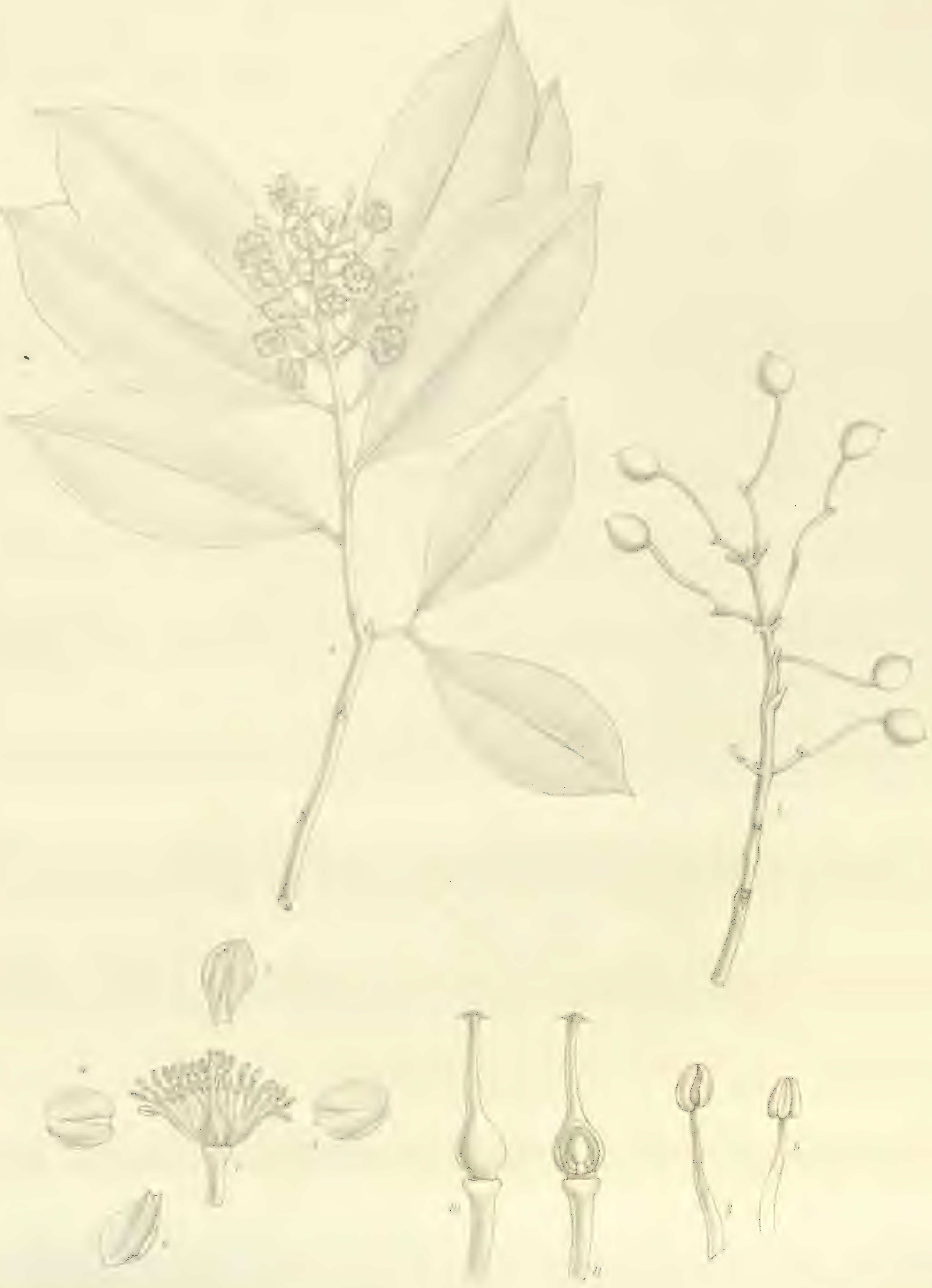
[illegible]



Drawn by G. C. Dass

Lith by Chitra Silpi C°

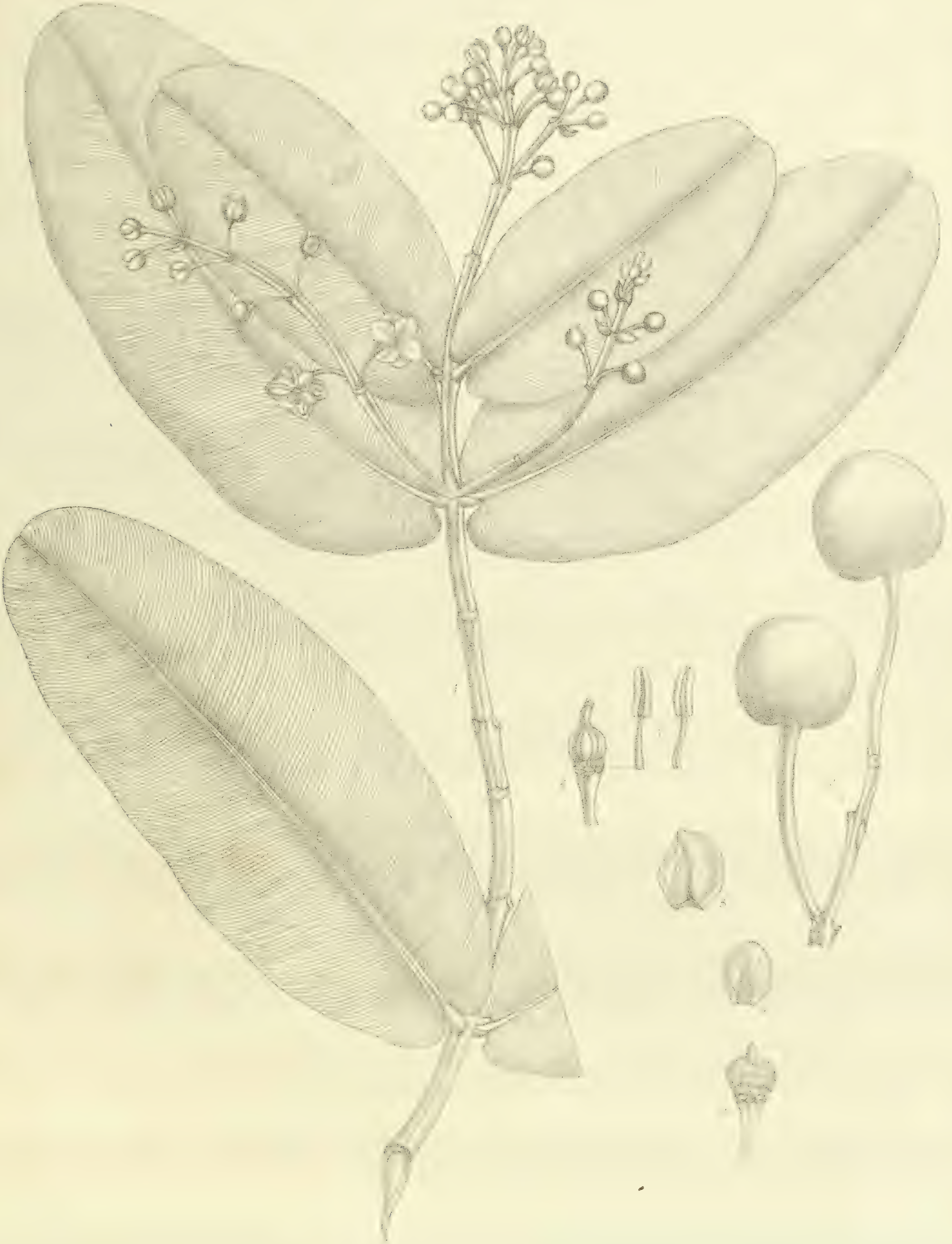
GARCINIA ANDAMANICA, King



Drawn by K. P. Dass.

CALOPHYLLUM PRAINIANUM, King.

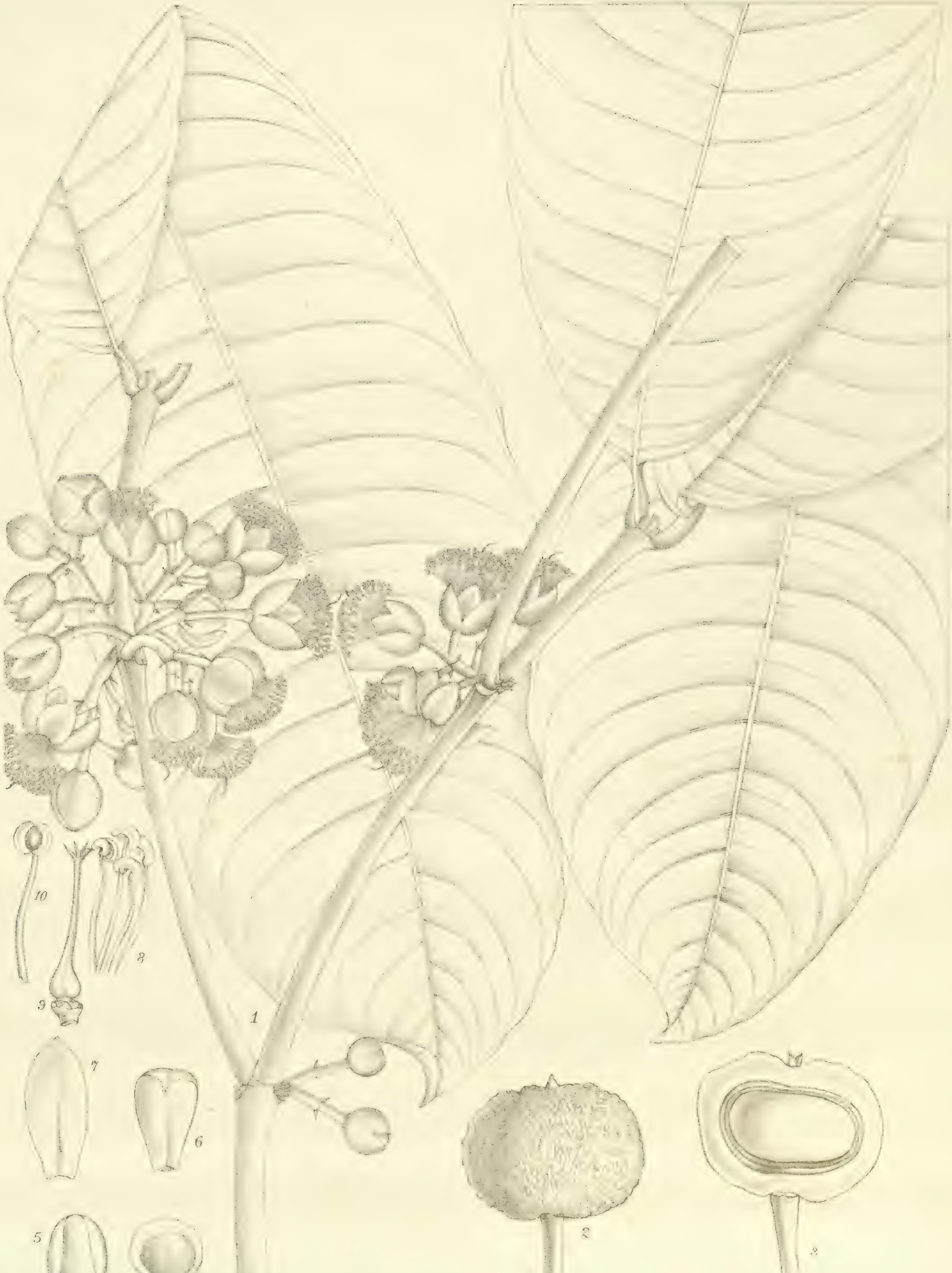
Lith. by A. C. Singha.



Drawn by E N Chowdhury

Lith. by A. L. Singh.

CALOPHYLLUM [illegible]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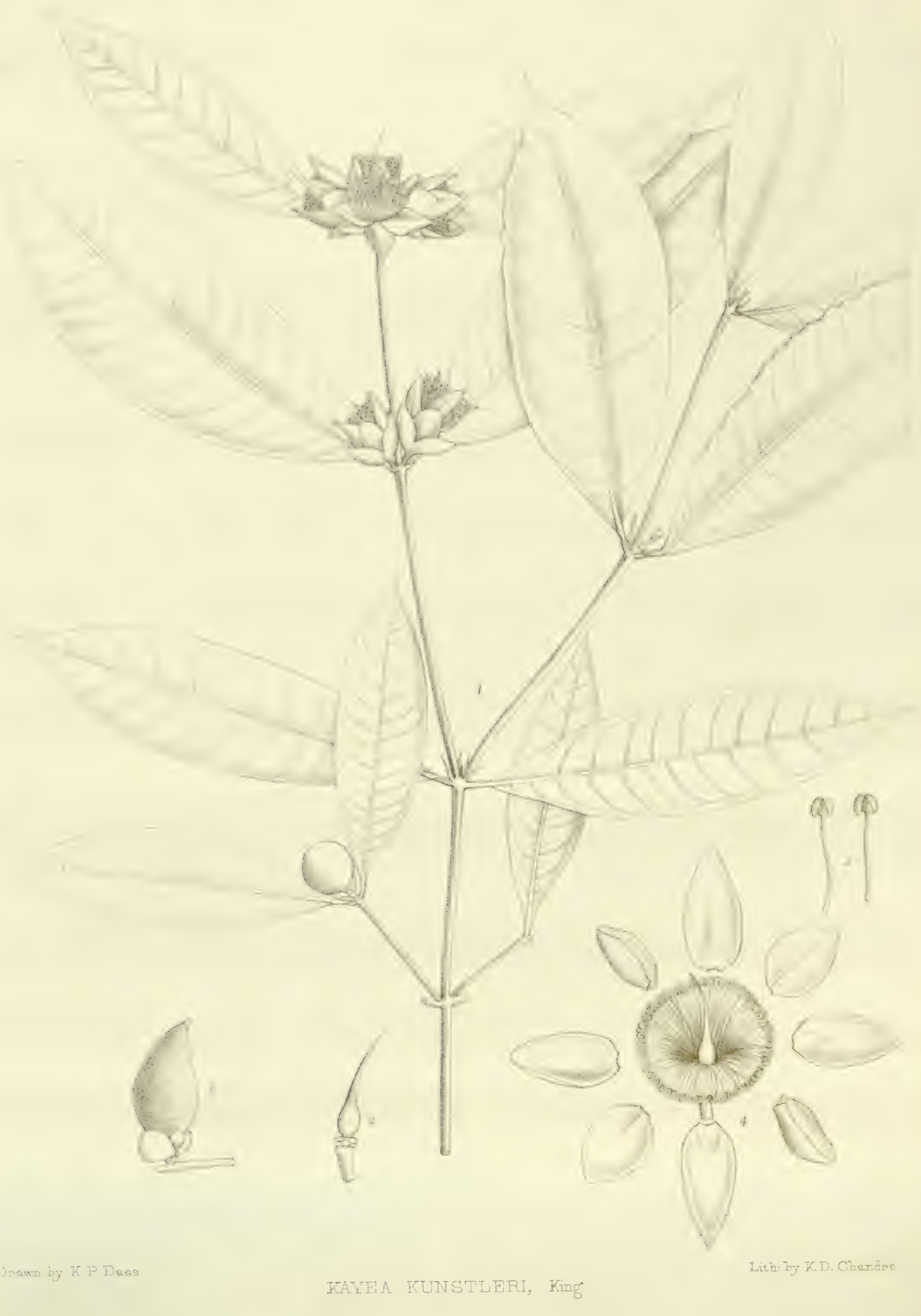
Drawn by G. C. Dass.

KAYEA GRANDIS, King.

Lith. by B. K. Roy.



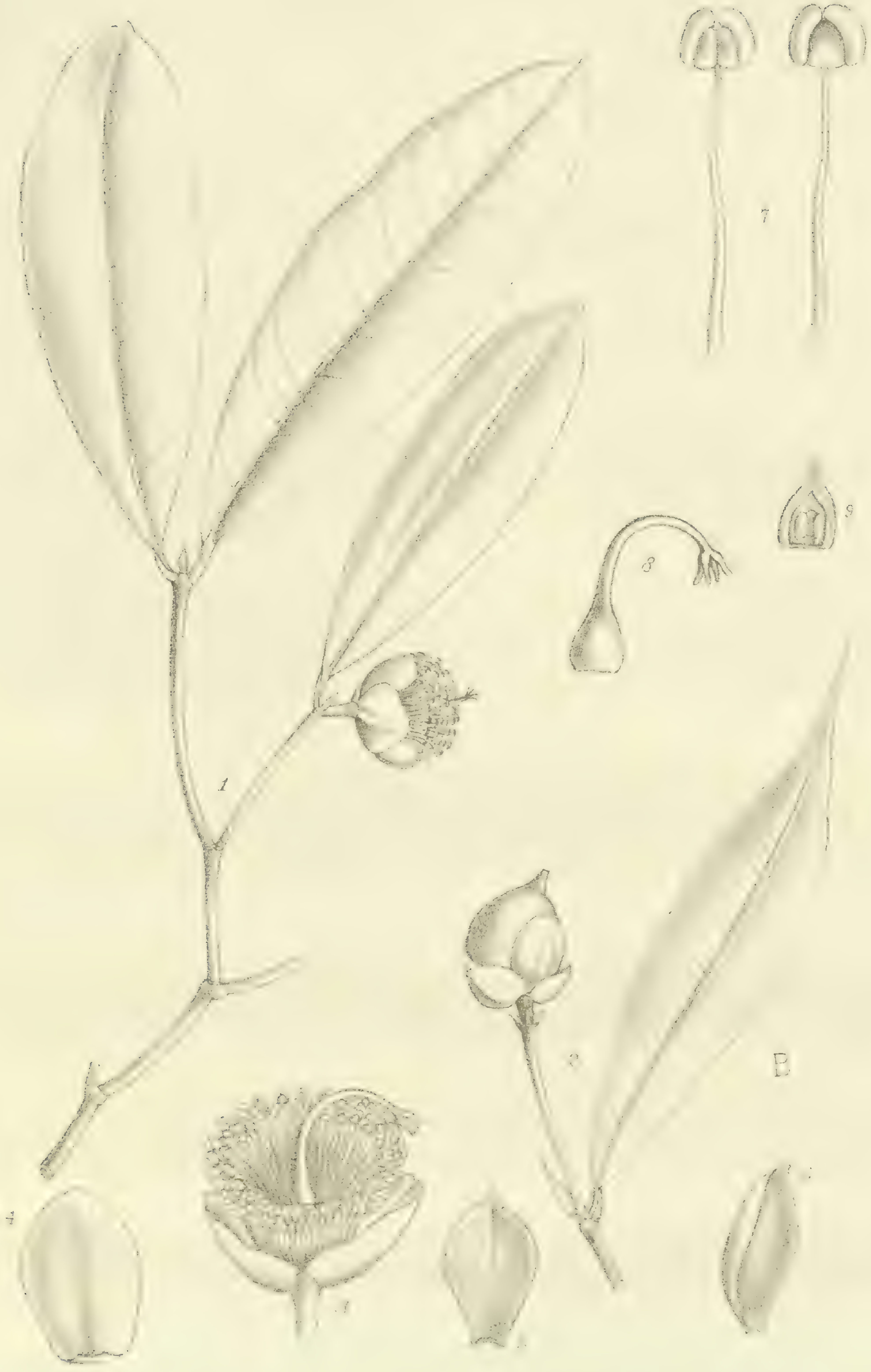
Drawn by K. P Dass

Lith: by K.D. Chandra

KAYEA KUNSTLERI, King

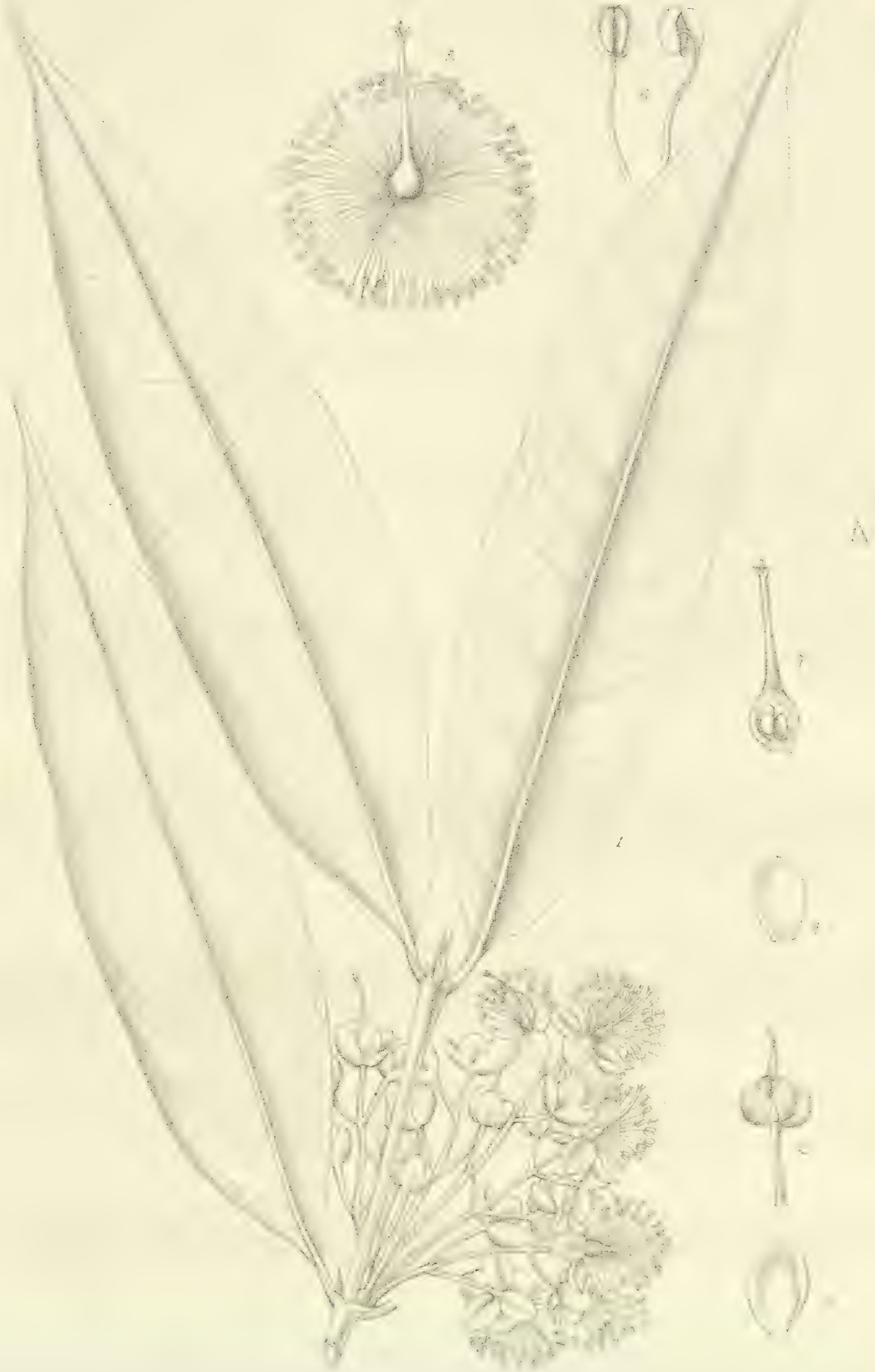
New Indian Plants.

Ann. Roy. Bot. Gard. Calcutta, Vol. 5, PLATE 174.



Drawn by K.P. Dass.

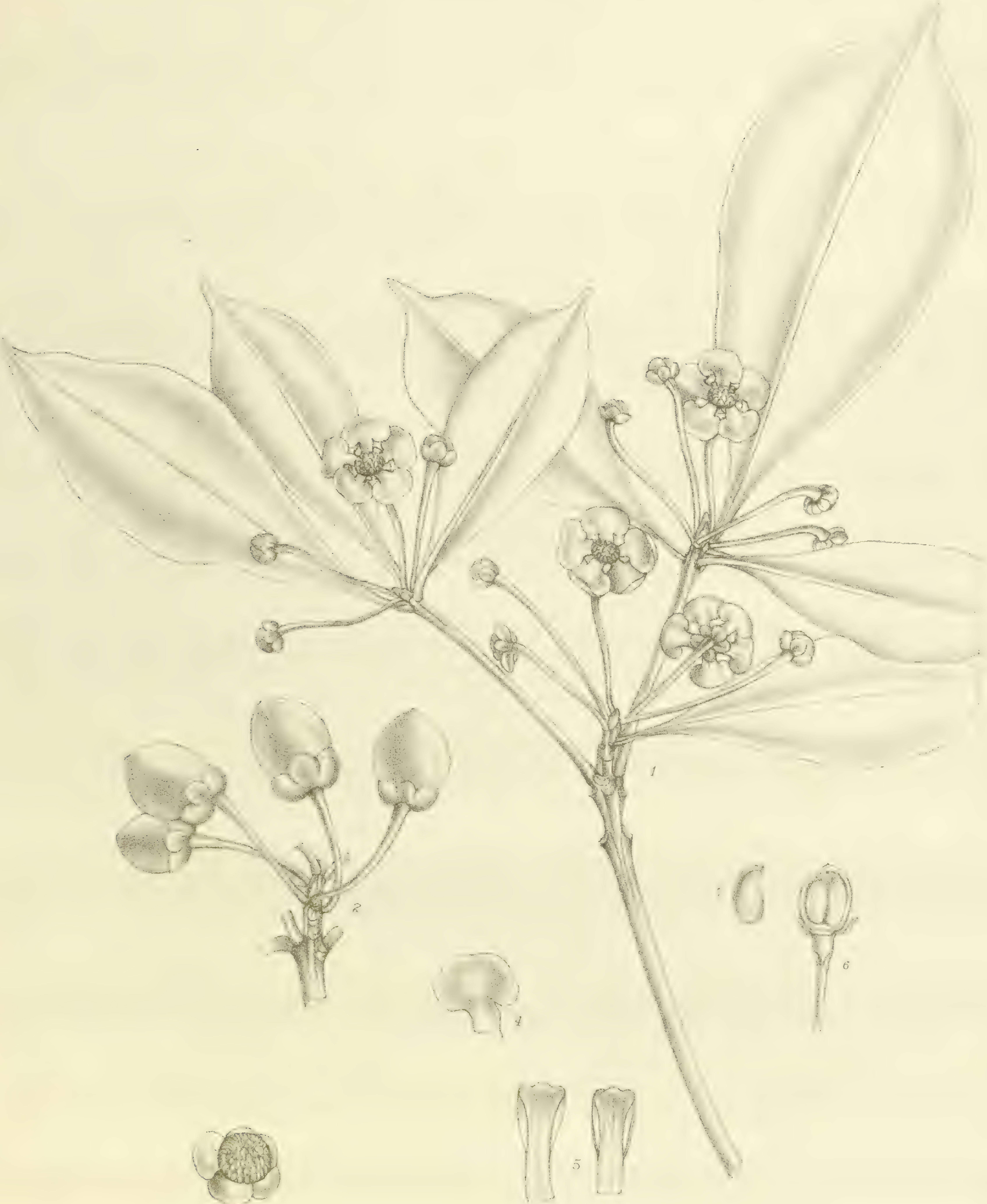
KAYEA CURTISII, King.



Drawn by D.N. Chaudhury.

KAYEA MANII, King.

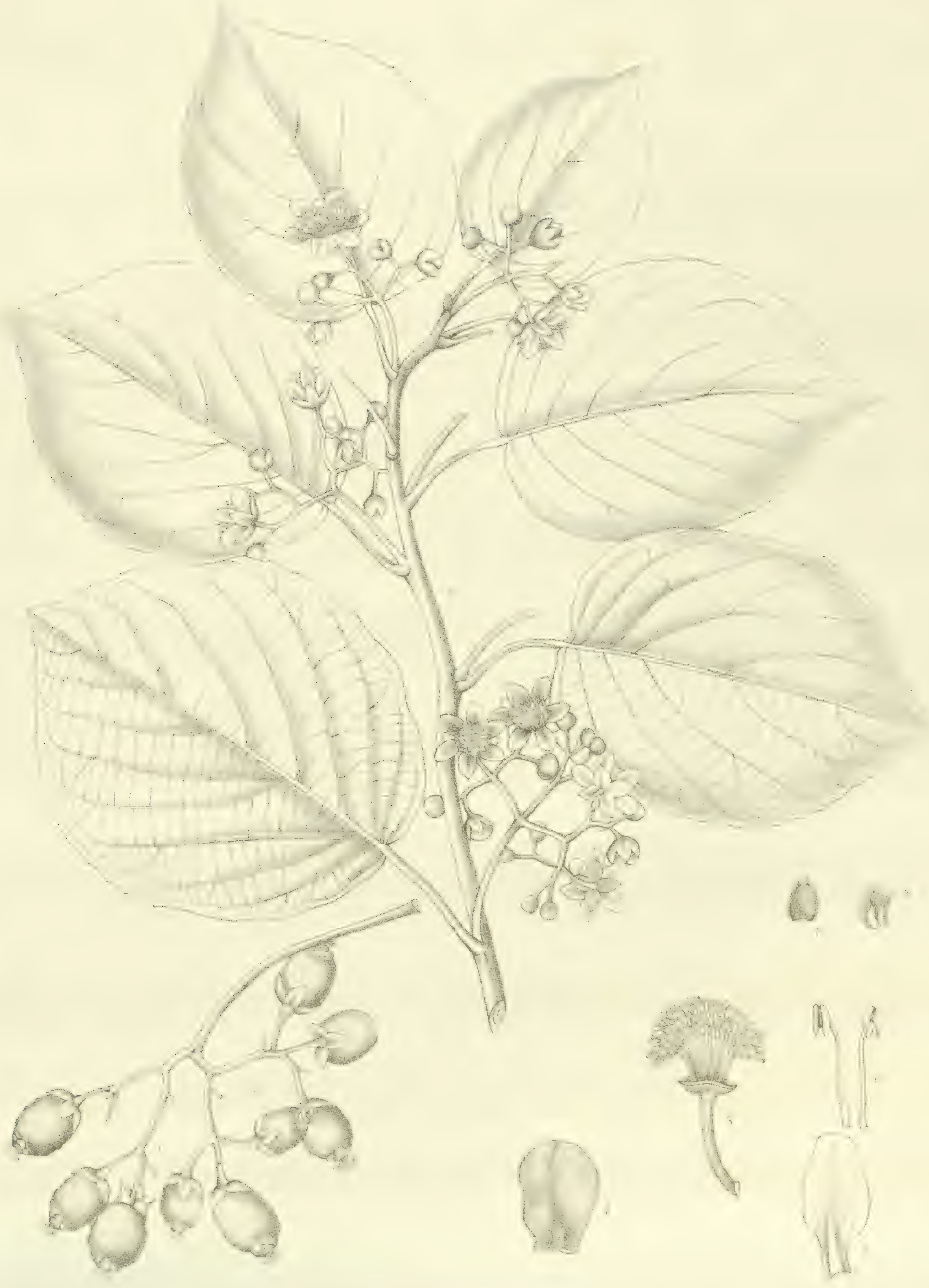
Lith: by K. P. Dass.



Drawn by G. C. Dass.

TERNSTRŒMIA SCORTECHINII, King.

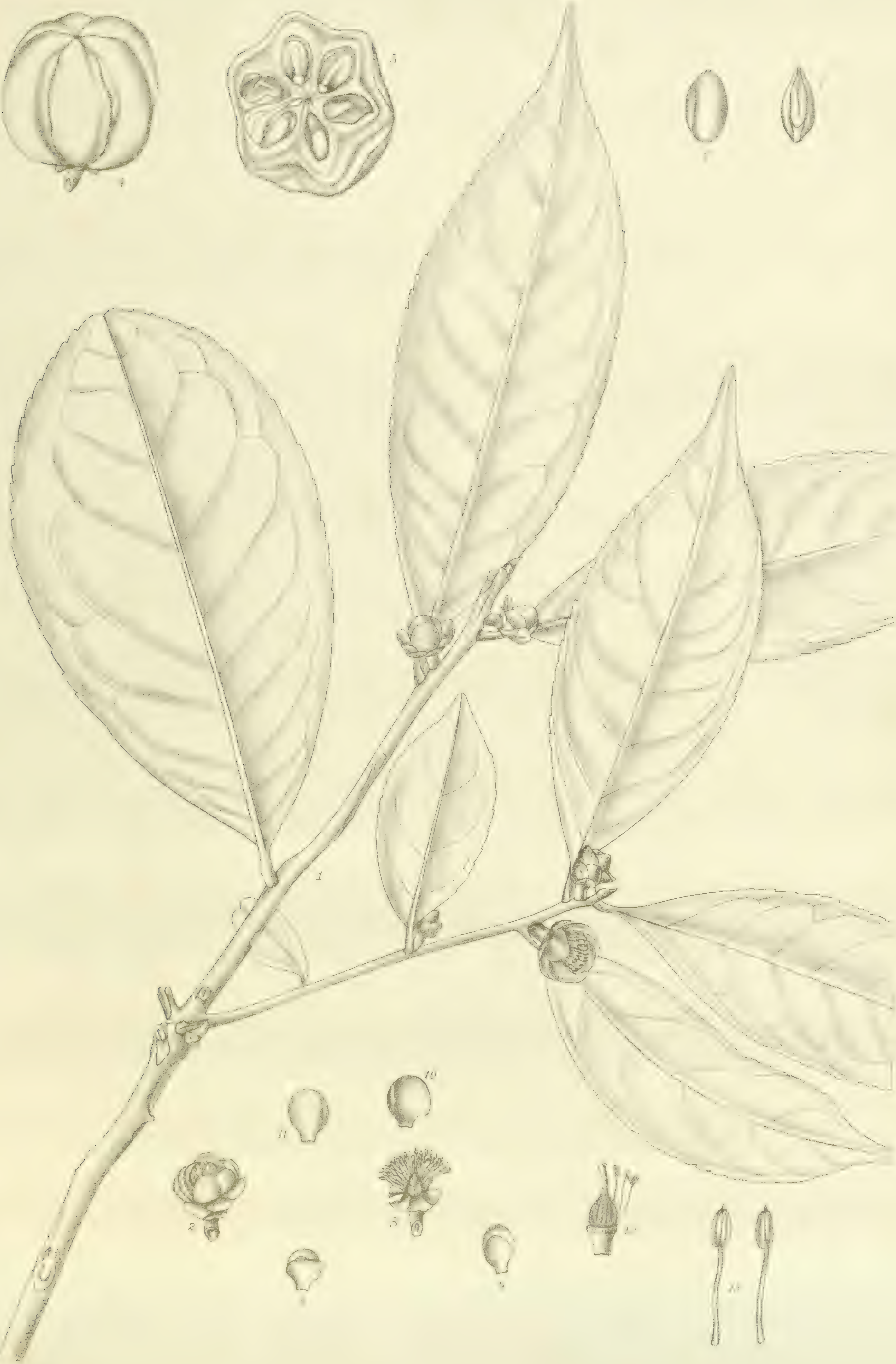
Lith: by A. D. Molla.



Drawn by A. [illegible]

Lith: by K P. Dass.

ACTINIDIA MIQUELII, King.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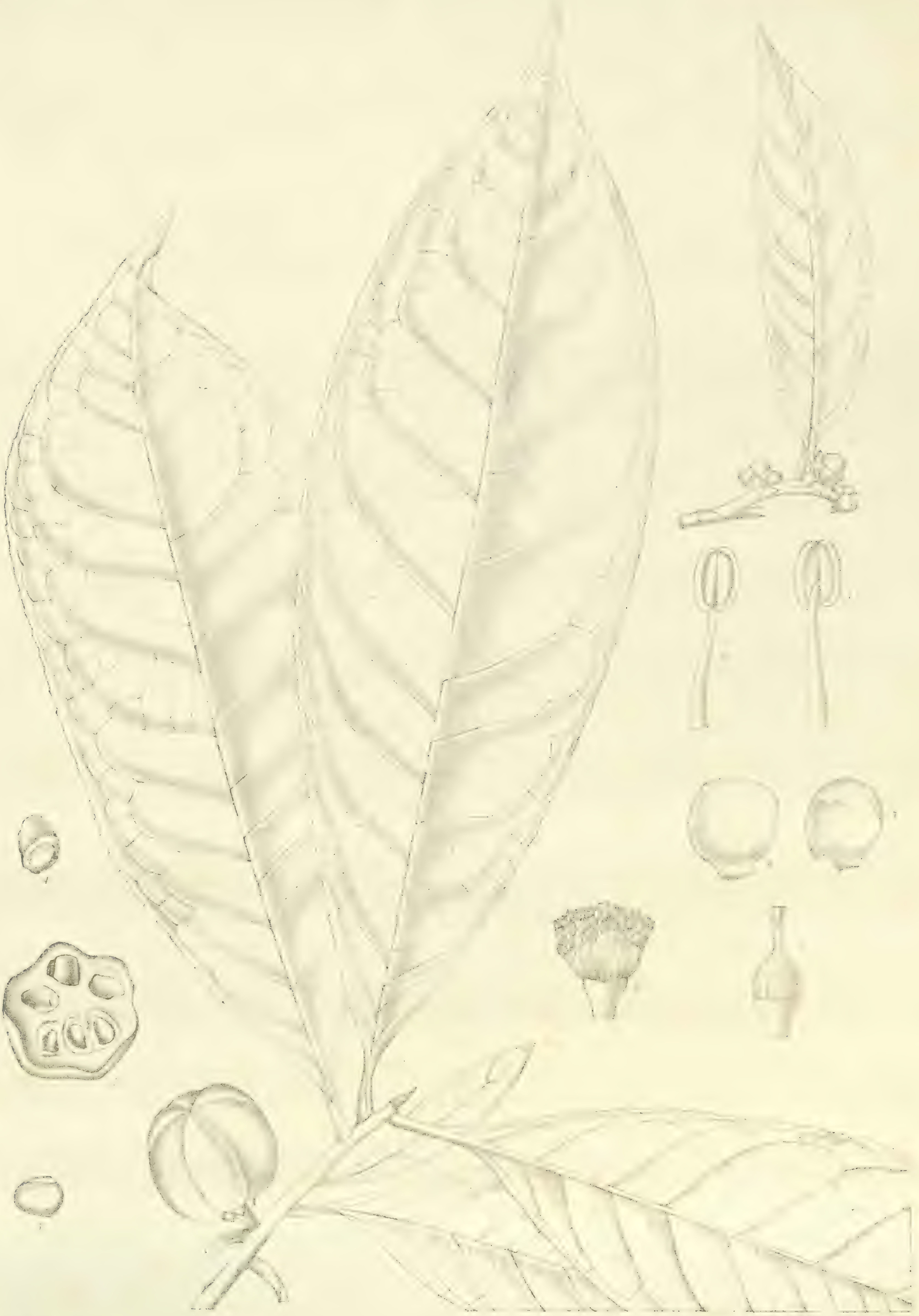
Drawn by A. C. [illegible]

Lith. by A. L. Singh.

PYRENARIA KUNSTLERI, King.



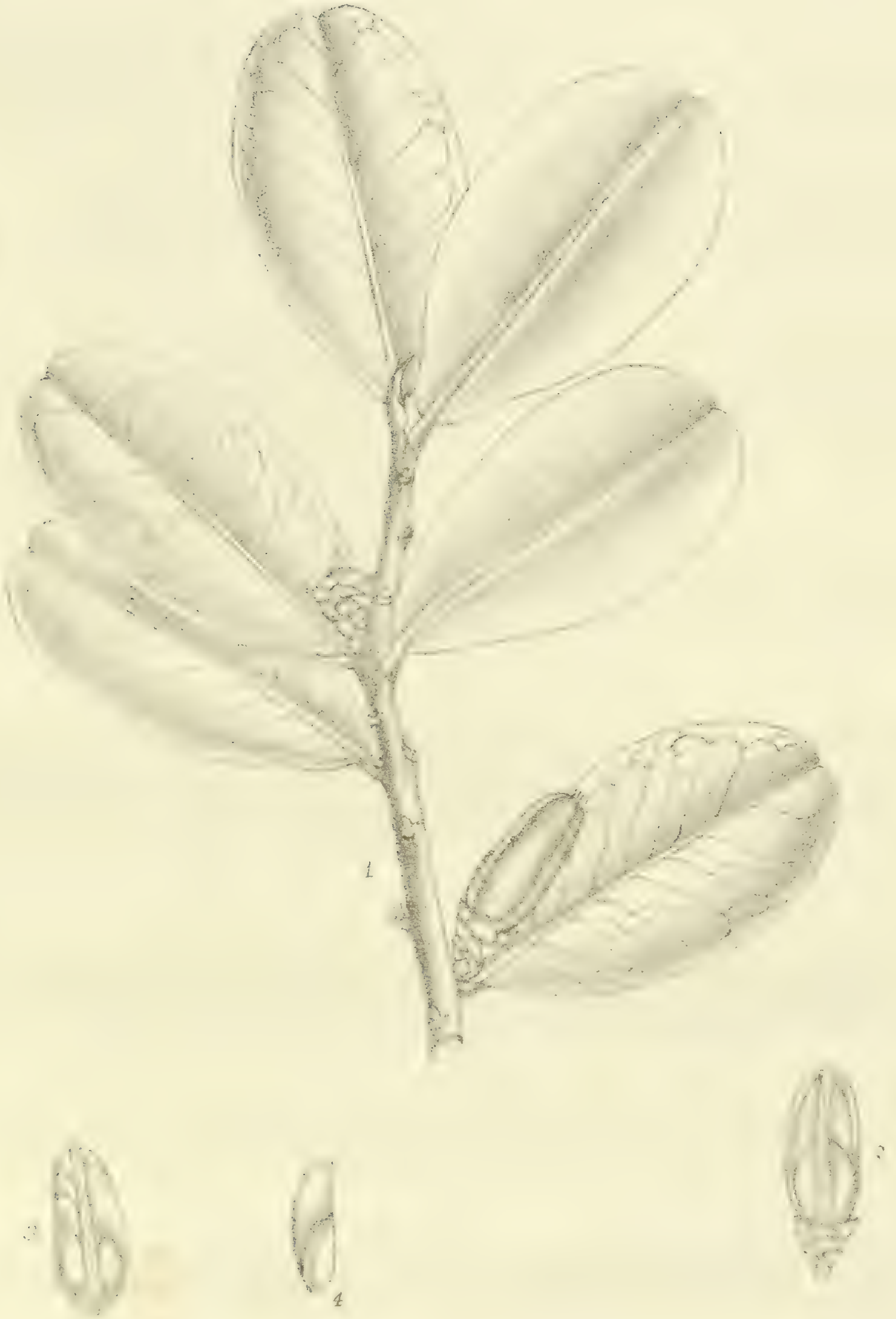
Drawn by A. L. [illegible]

Lith. by B. [illegible] Roy

PYRENARIA WRAYI, King.

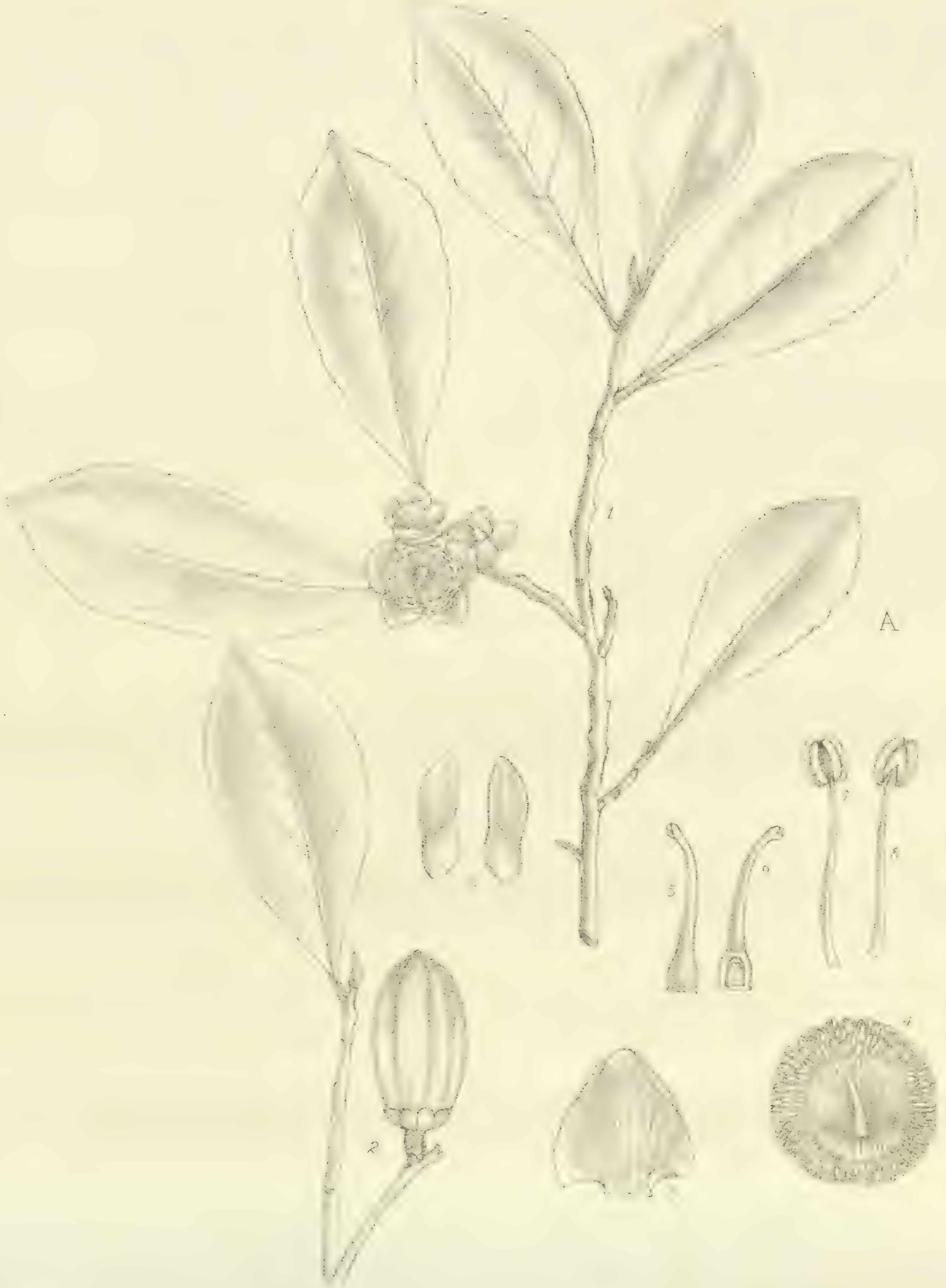
New Indian Plants.

Ann. Roy. Bot. Gard. Calcutta. Vol. 5. PLATE 179.



Drawn by A. D. Molla.

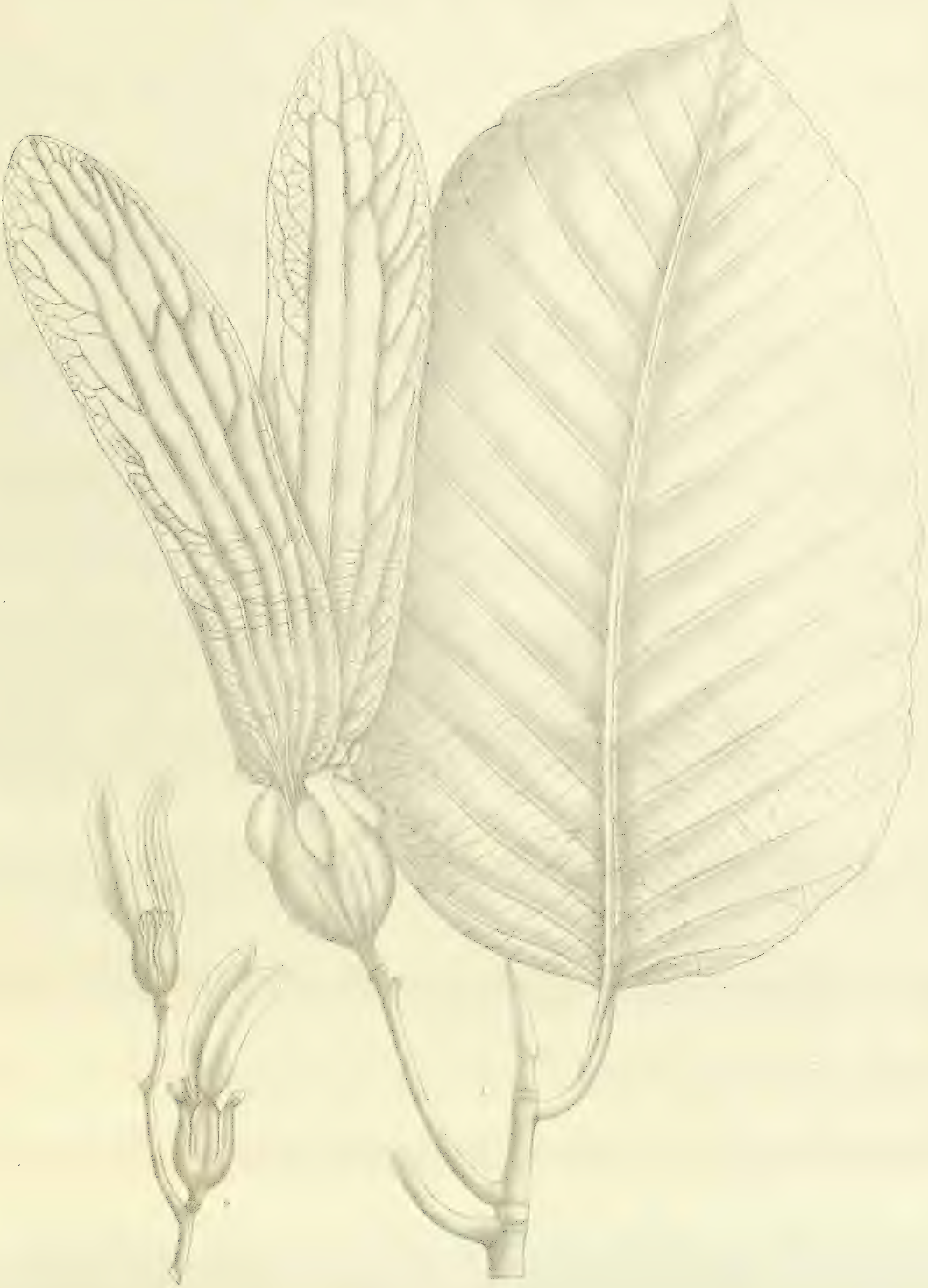
GORDONIA IMBRICATA, King.



Drawn by K.P. Dass.

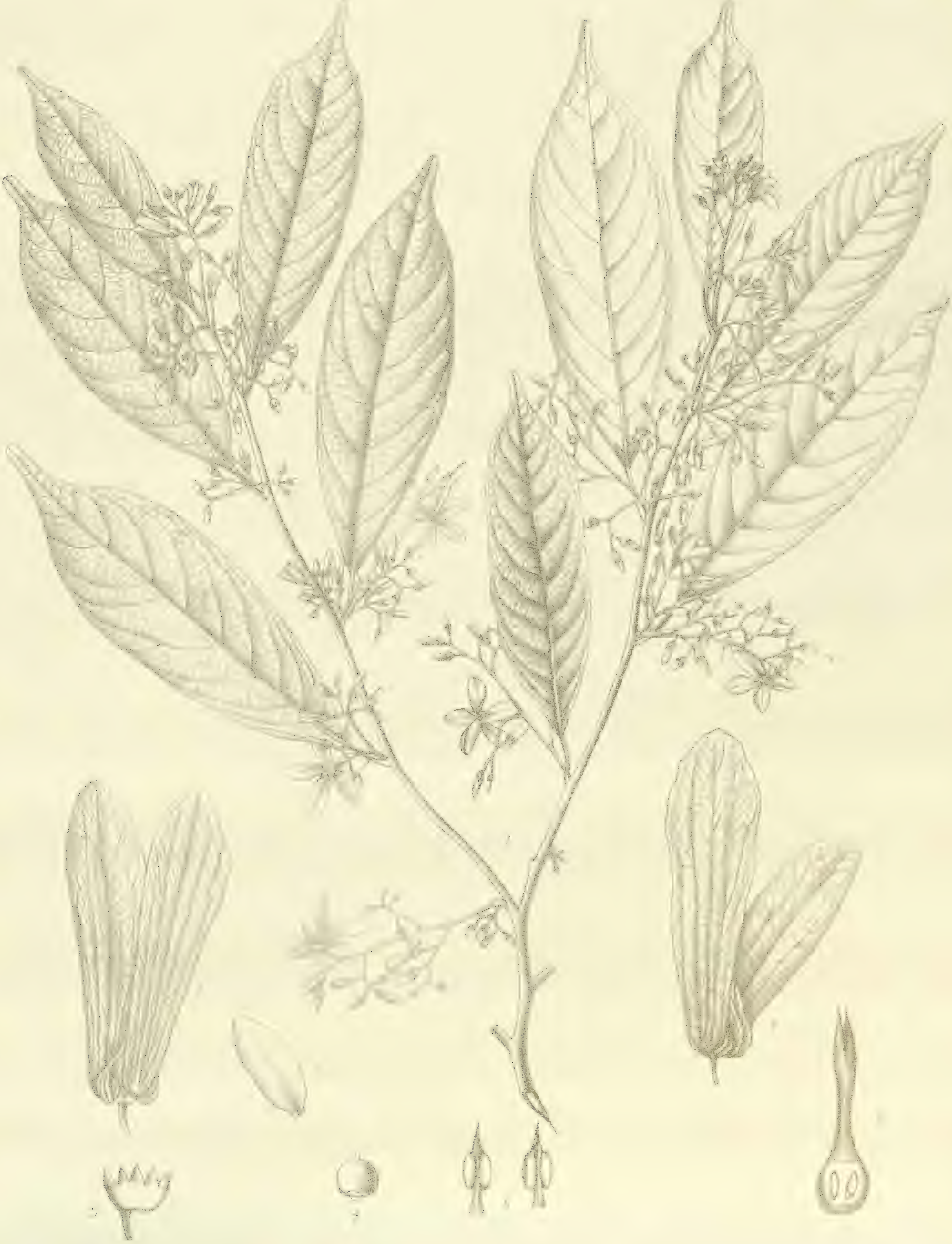
GORDONIA MAINGAYI, King.

Lith: by A. D. Molla.



Drawn by A. P. Mitra.   Lith: by A. L. Singh

DIPTEROCARPUS KUNSTLERI King.



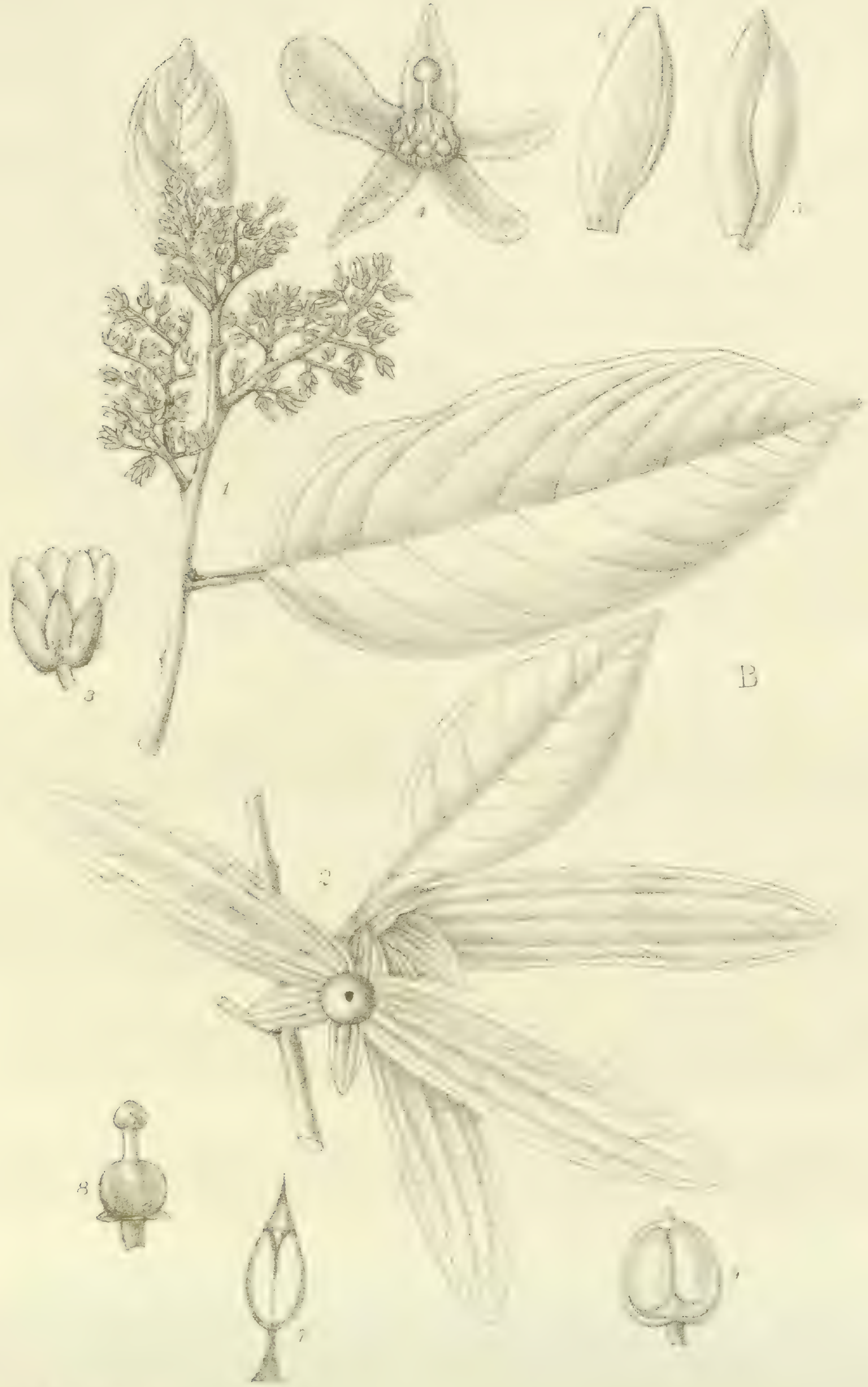
D. N. Chowdhary delt.

A. C. Chowdhary lith

VATICA PERAKENSIS, King.

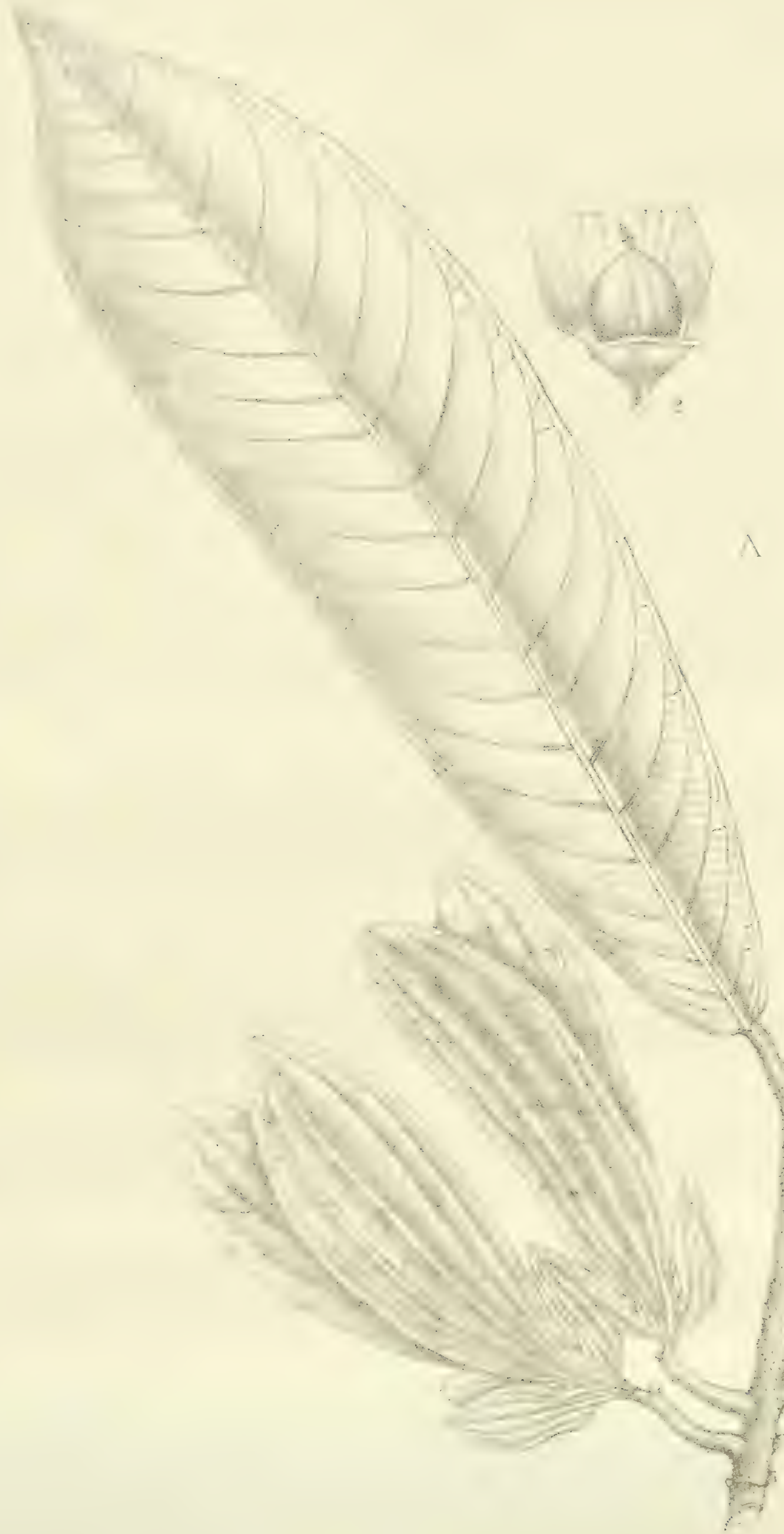
New Indian Plants.

Ann. Roy. Bot. Gard. Calcutta, Vol. 5, PLATE 182.



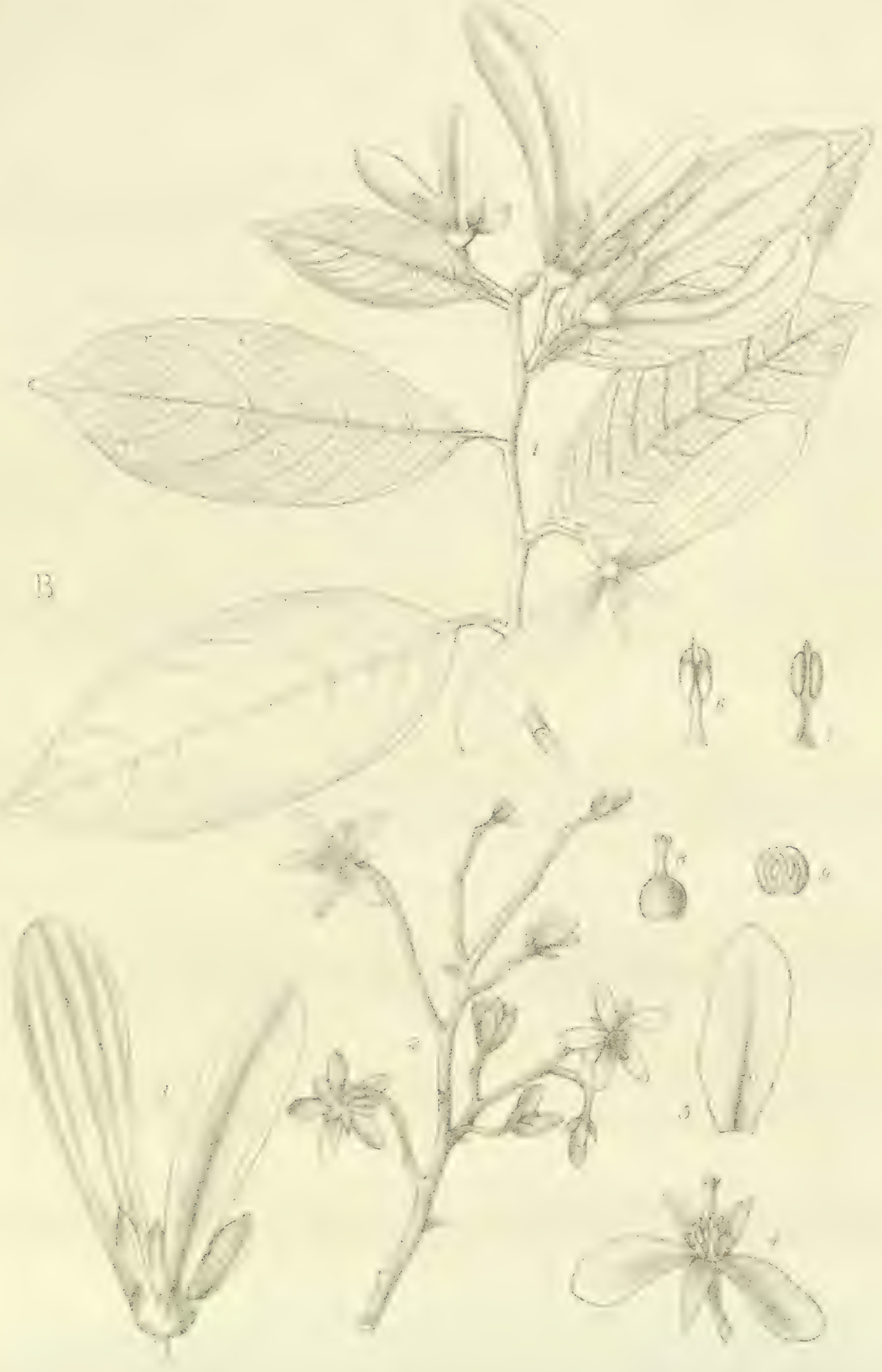
Drawn by G. C. Das.

VATICA LOWII, King.



Lith: by A. L. Singh.

VATICA NITENS, King.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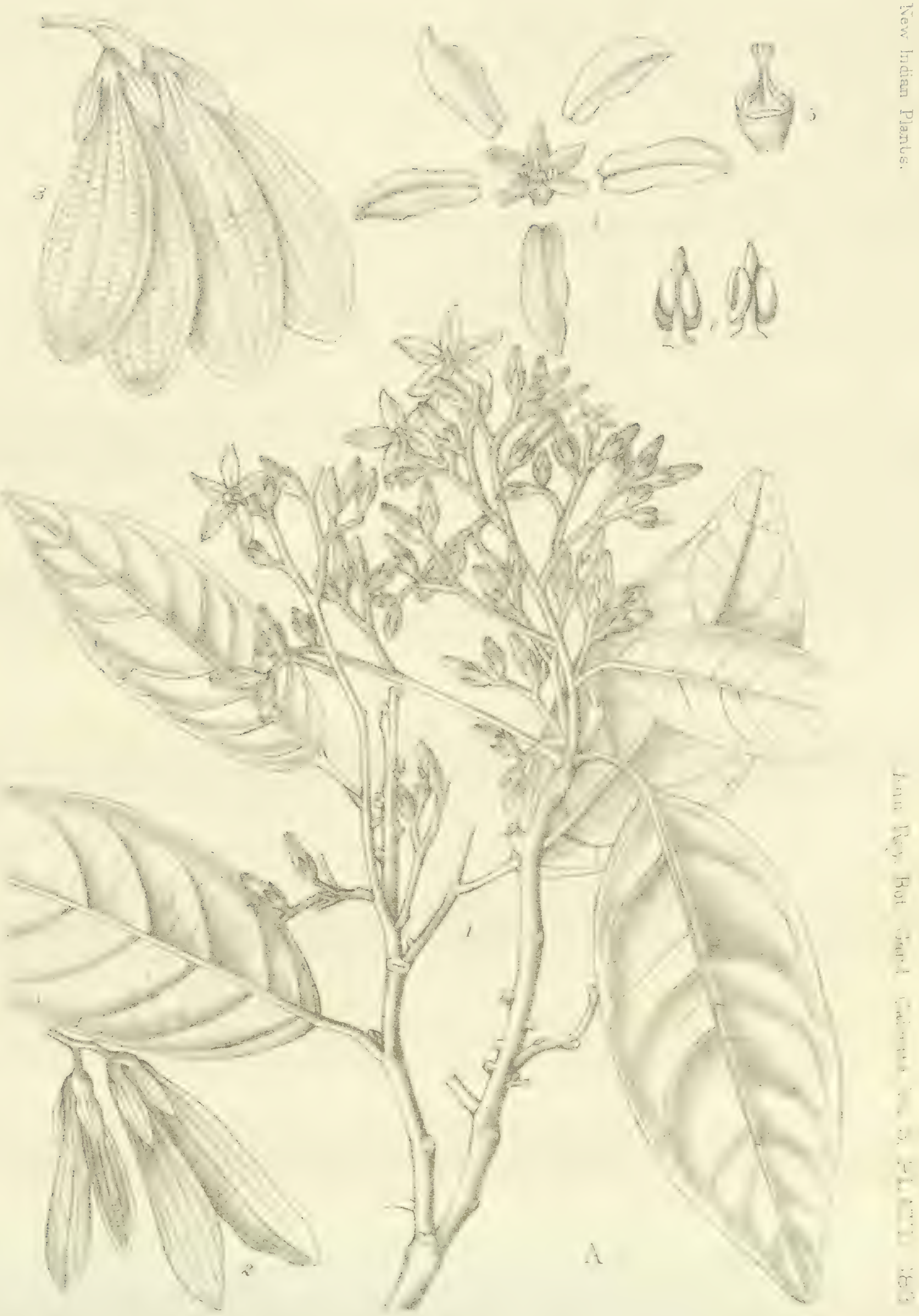


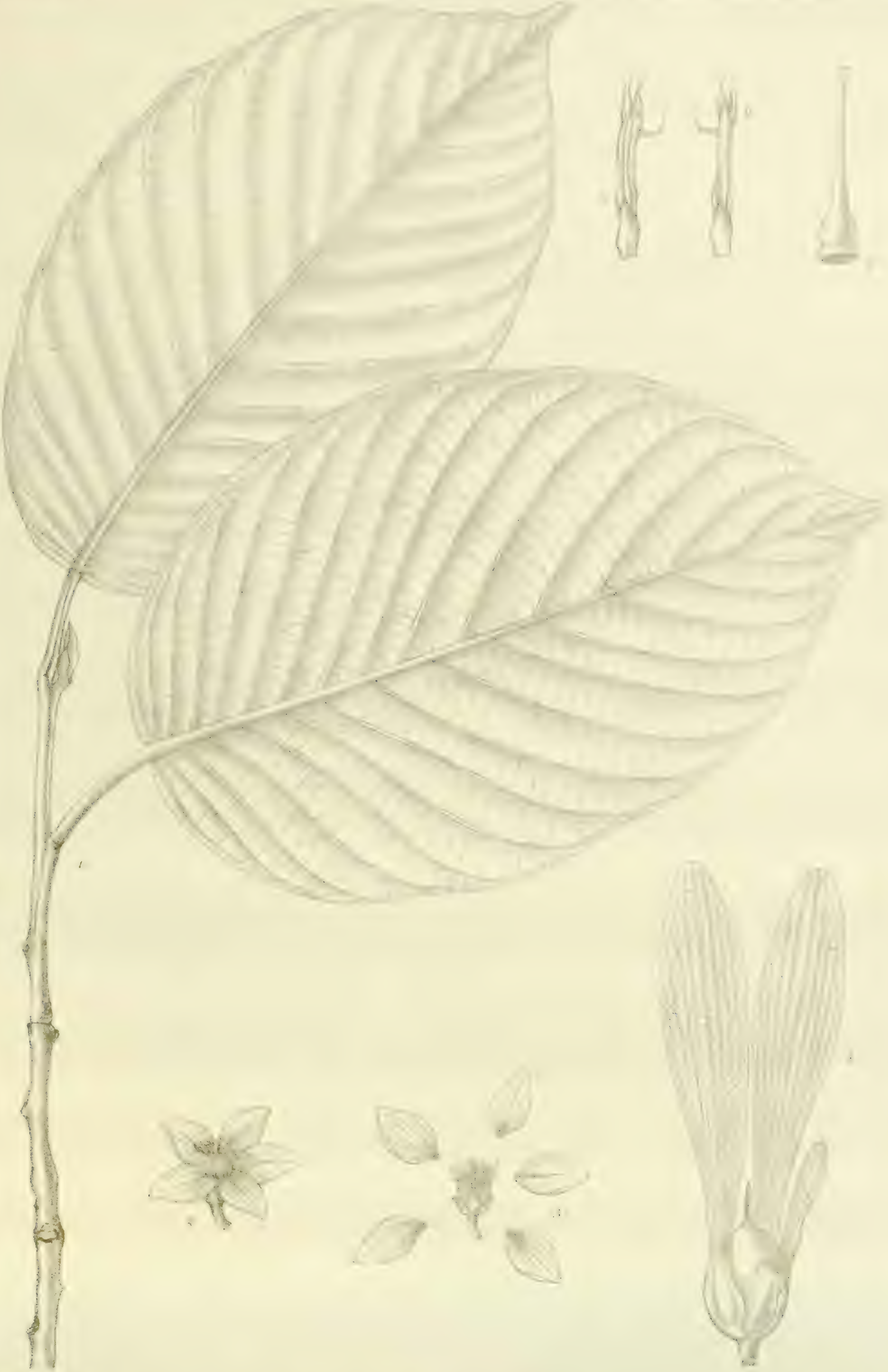
Ann. Roy. Bot. Gard. Calcutta Vol. [illegible] PLATE [illegible]

Drawn by A. L. Singh.

VATICA CURTISII, King.

Lith: by K. P. Dass.

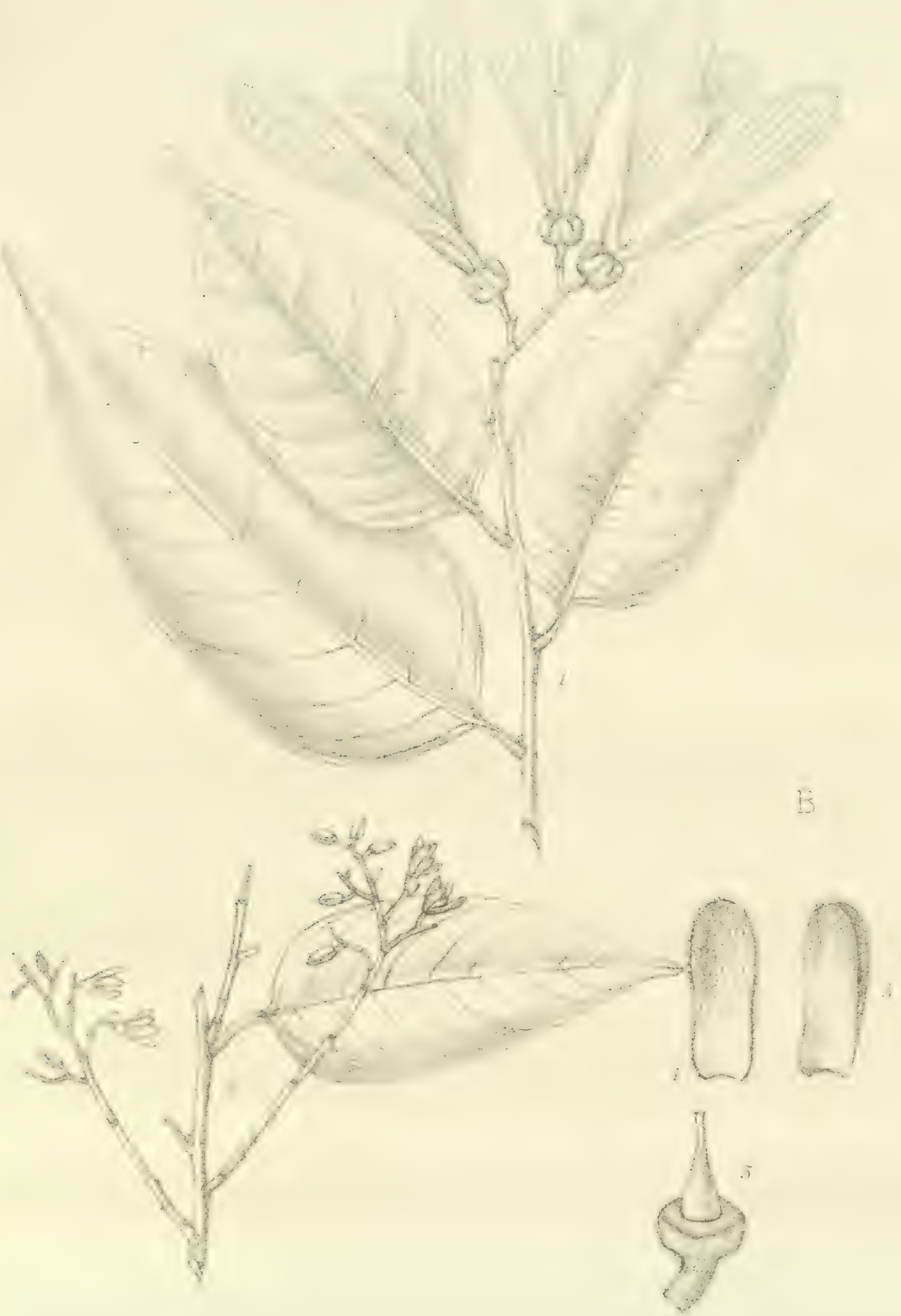
VATICA CINEREA, King.



Drawn by A. L. Singh.

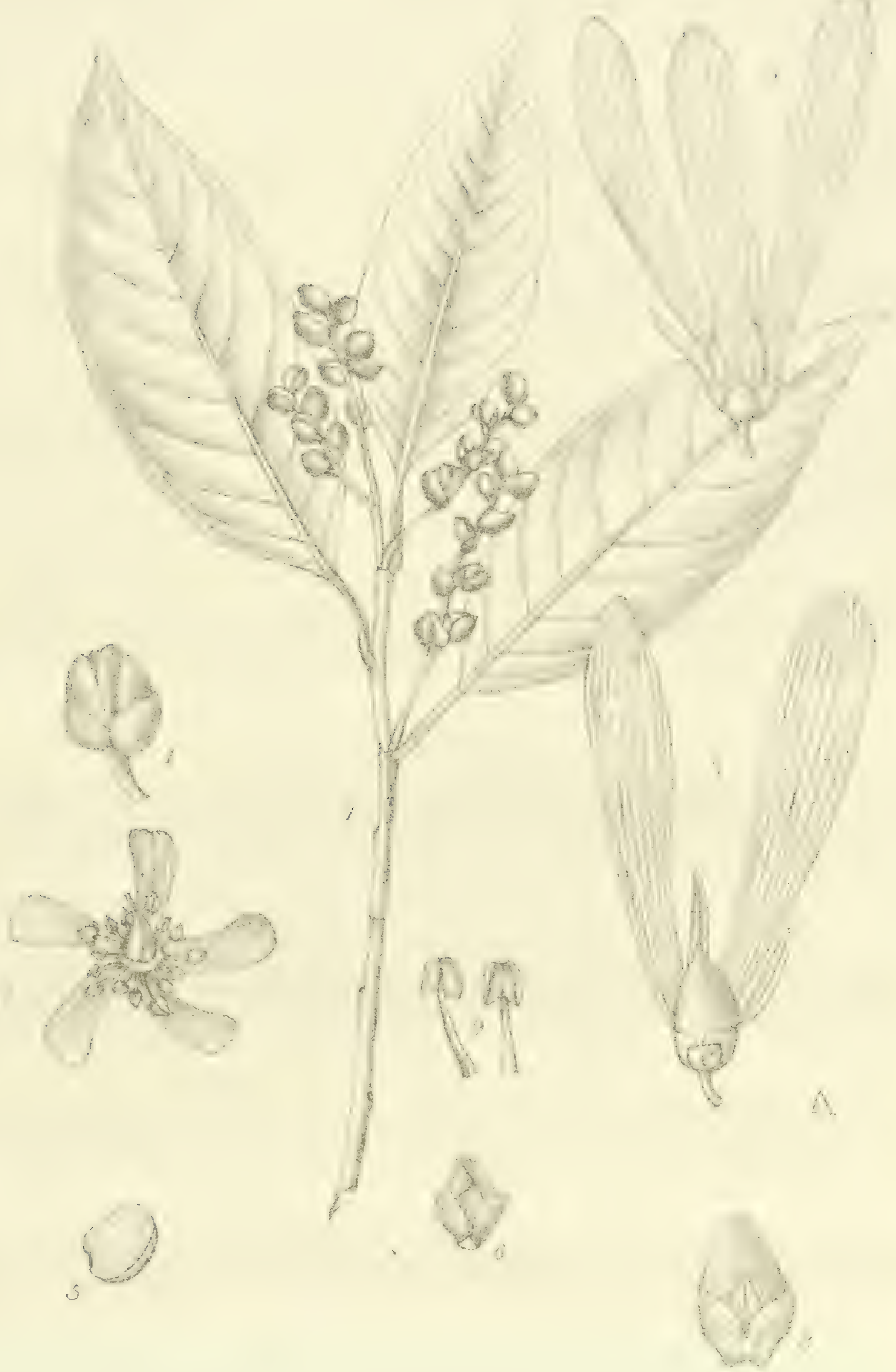
Lith. by A. L. Singh.

PENTACME MALAYANA, King.



Drawn by A. D. Molla.

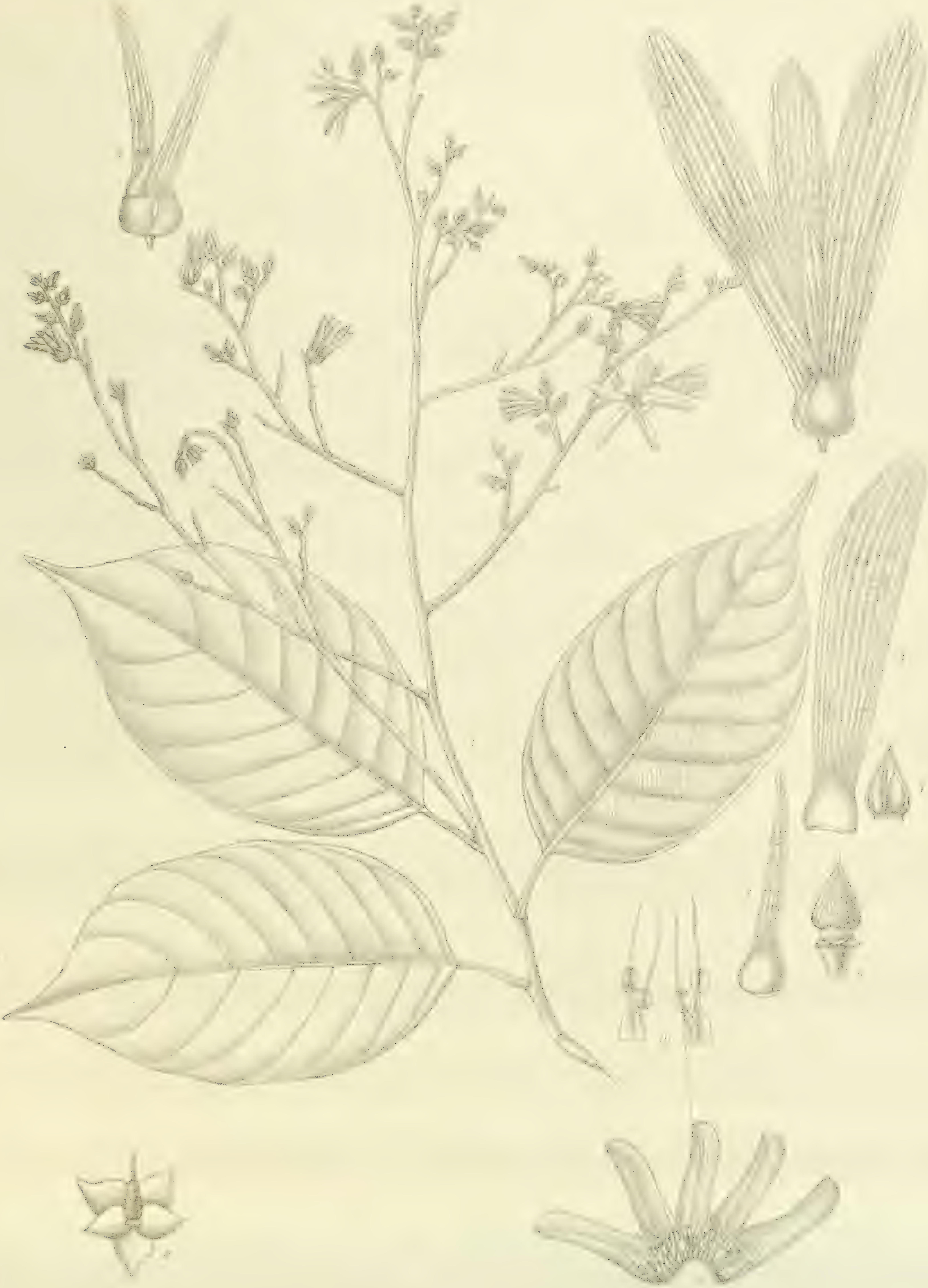
SHOREA RIDLEYANA, King.



Drawn by G. C. Dass.

SHOREA CURTISII, Dyer.

Lith. by A. D. Molla

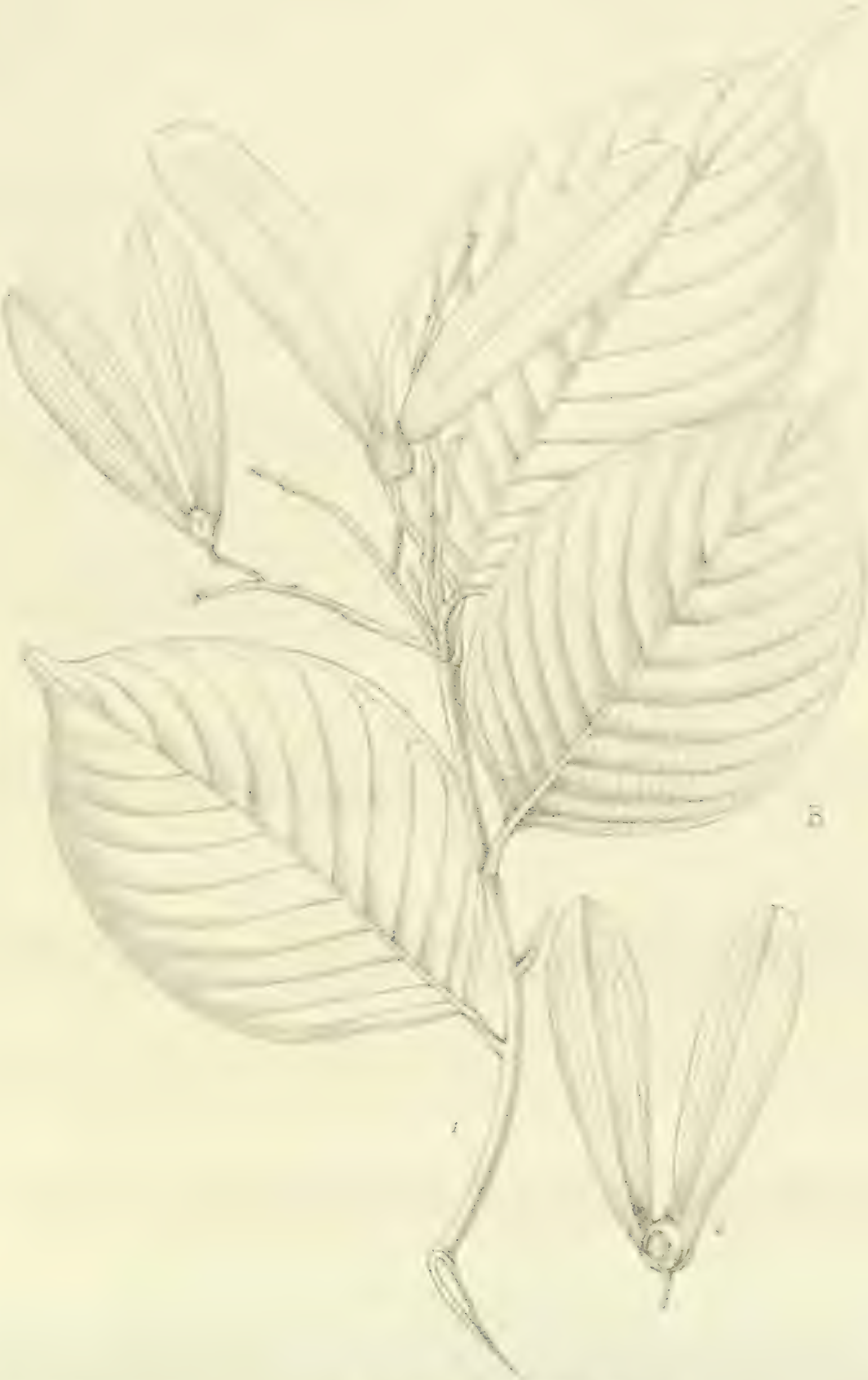


Drawn by D. N. Chowdhury.

Lith: by A. D. Molla.

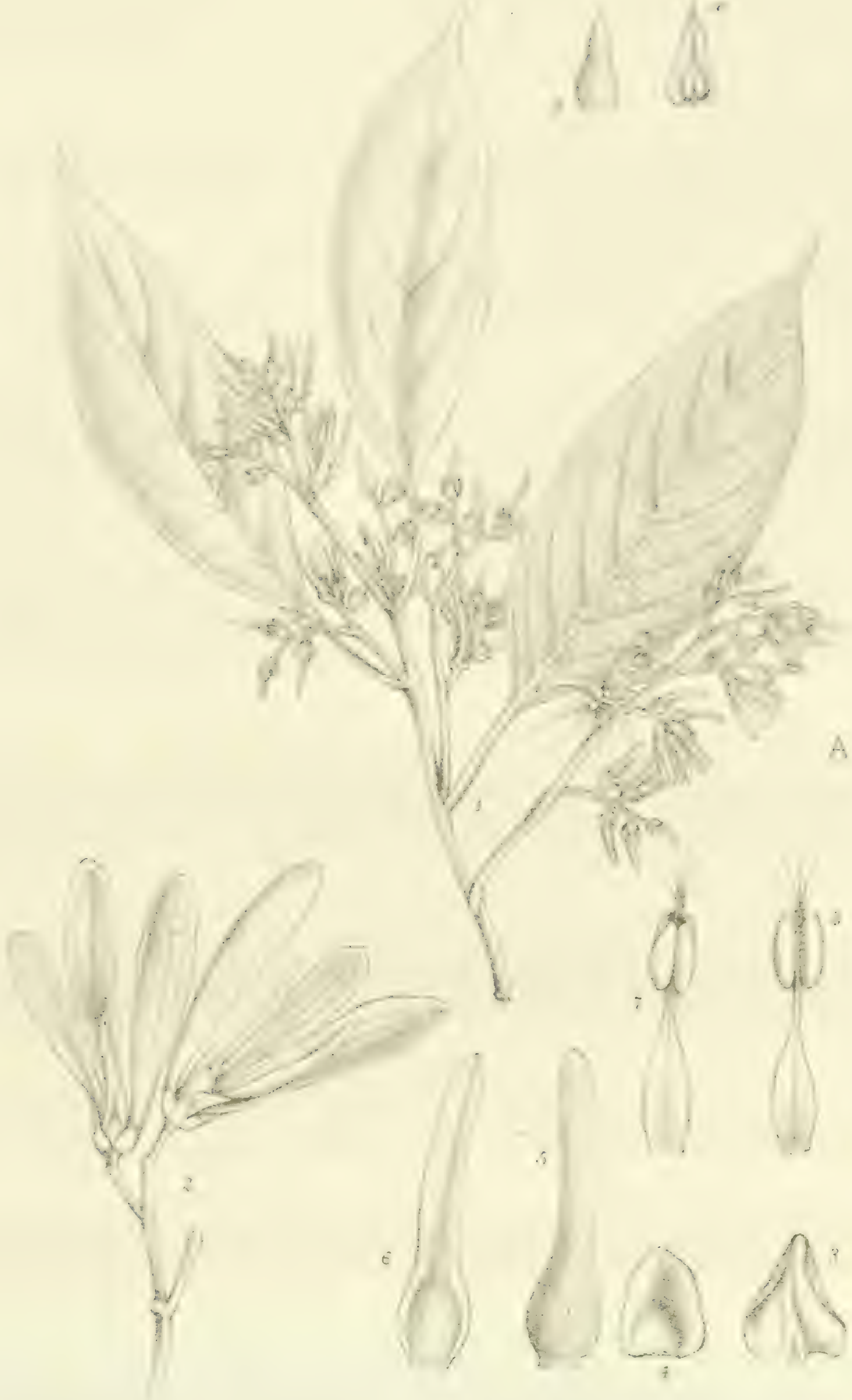
SHOREA KUNSTLERI, King.

Ann. Roy. Bot. Garden, Calcutta, Vol. 5, PLATE 187.



Drawn by B N Chowdhury

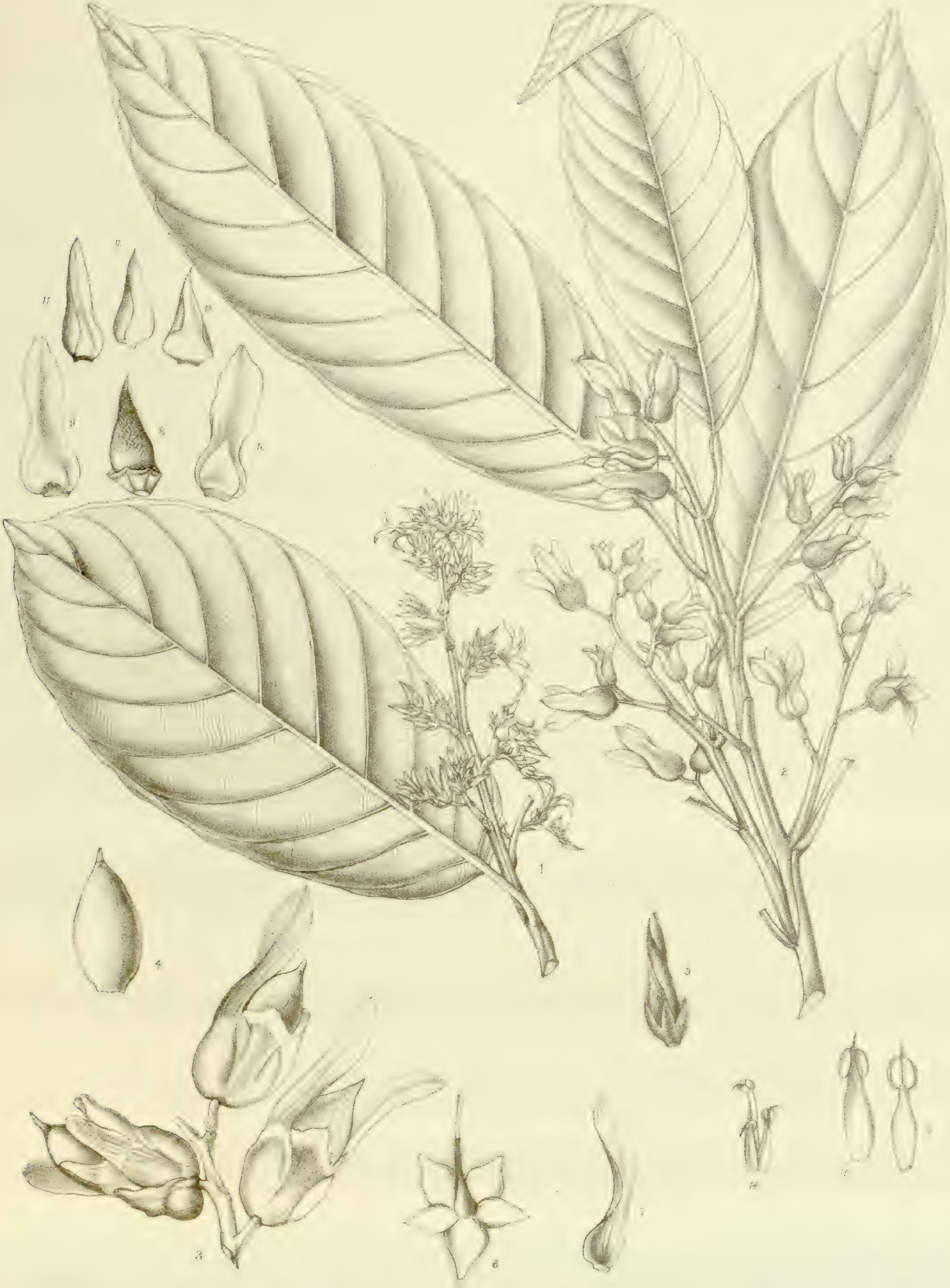
HOPEA CURTISII, King.



Drawn by K.P. Dass.

SHOREA CILIATA, King.

Lith by K. P. Dass.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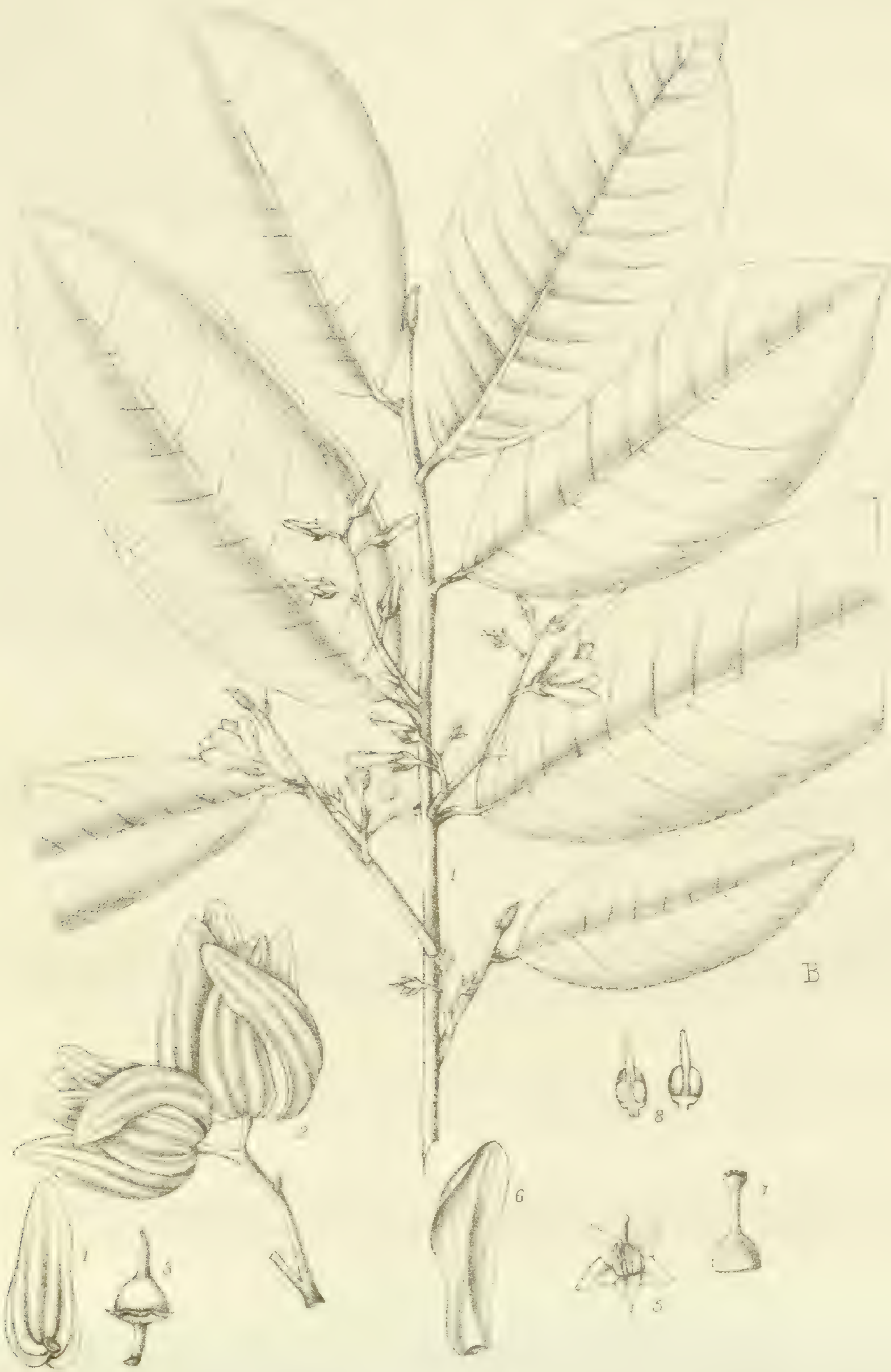
G.C. Dass delt

SHOREA THISELTONI, King.

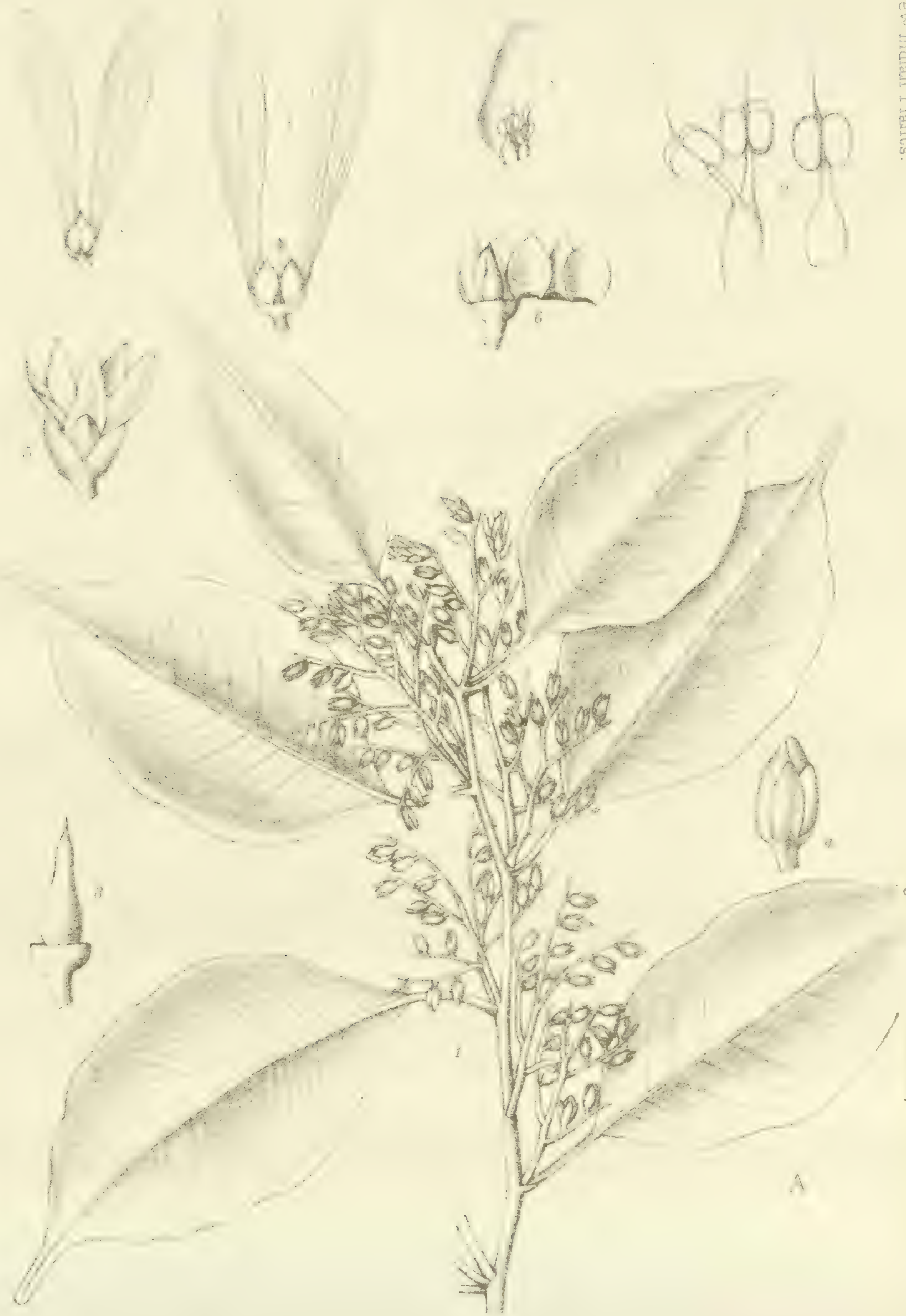
Lith: by A.C. Chowdhary.

Ann. Roy. Bot. Gard. Calcutta, Vol. 5, PLATE 189.



Drawn by A. D. Molla.

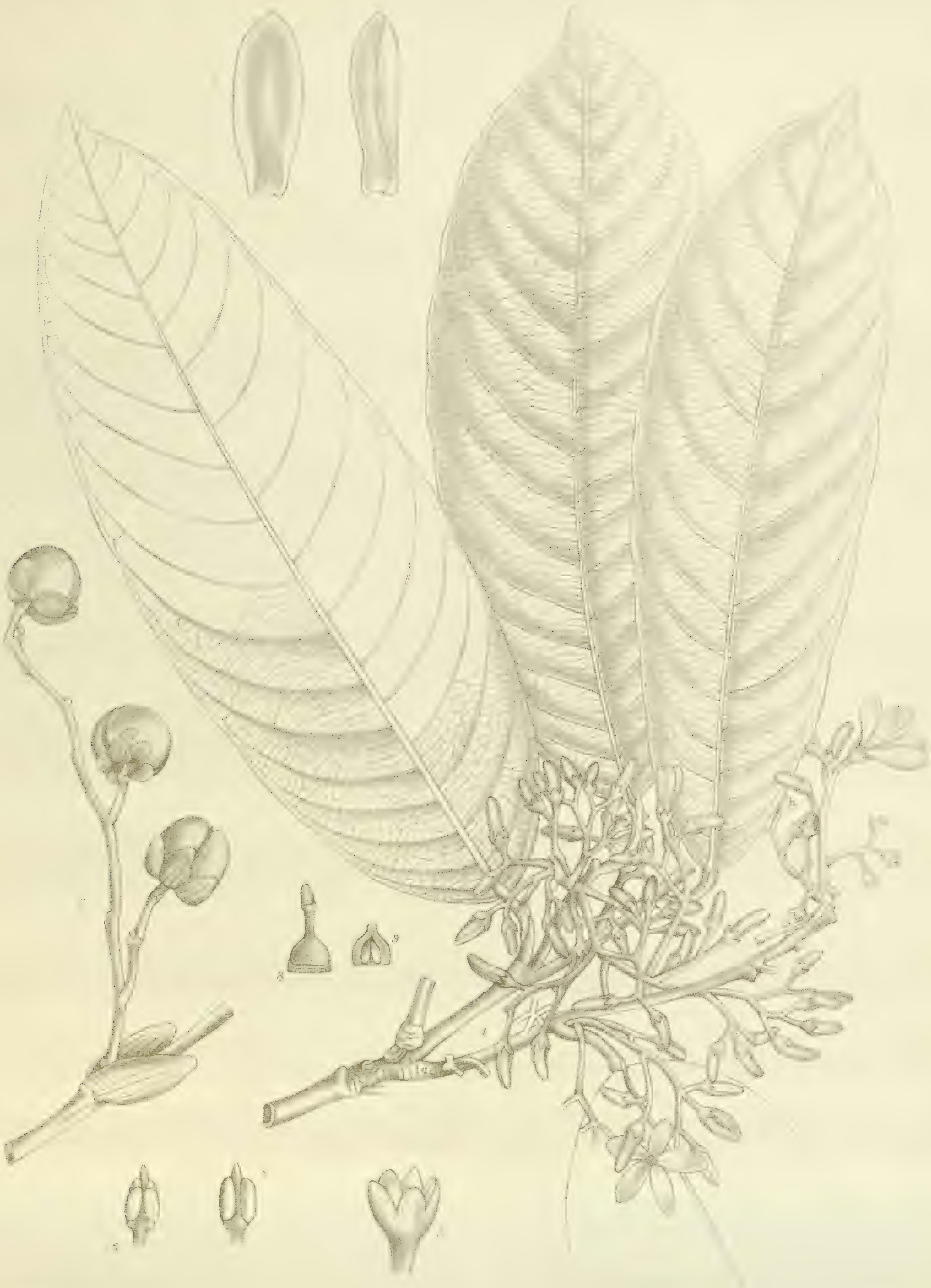
RETINODENDRON KUNSTLERI, King.



Drawn by A. L. Singh.

HOPEA INTERMEDIA, King.

Lith: by G. C. Dass.



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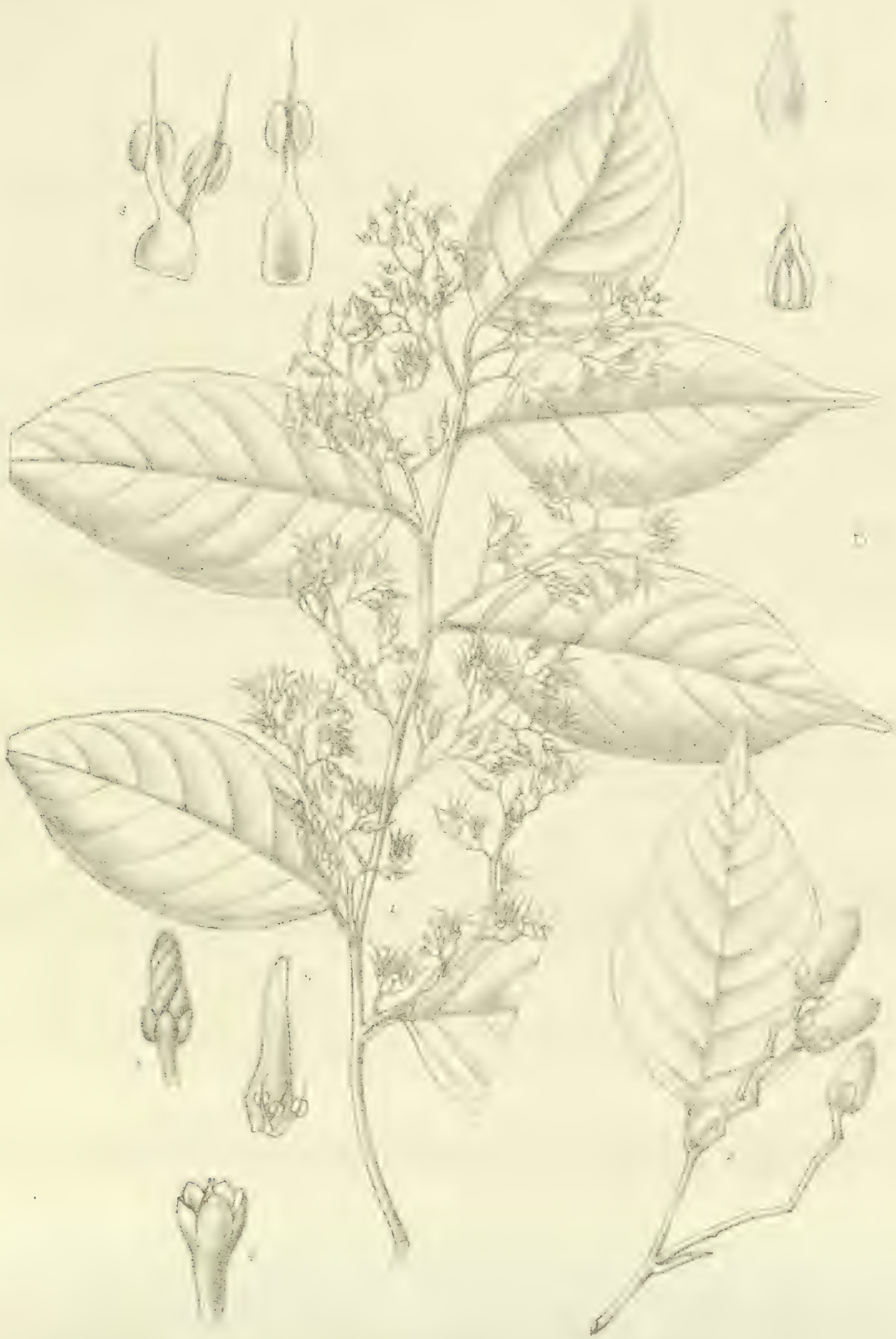
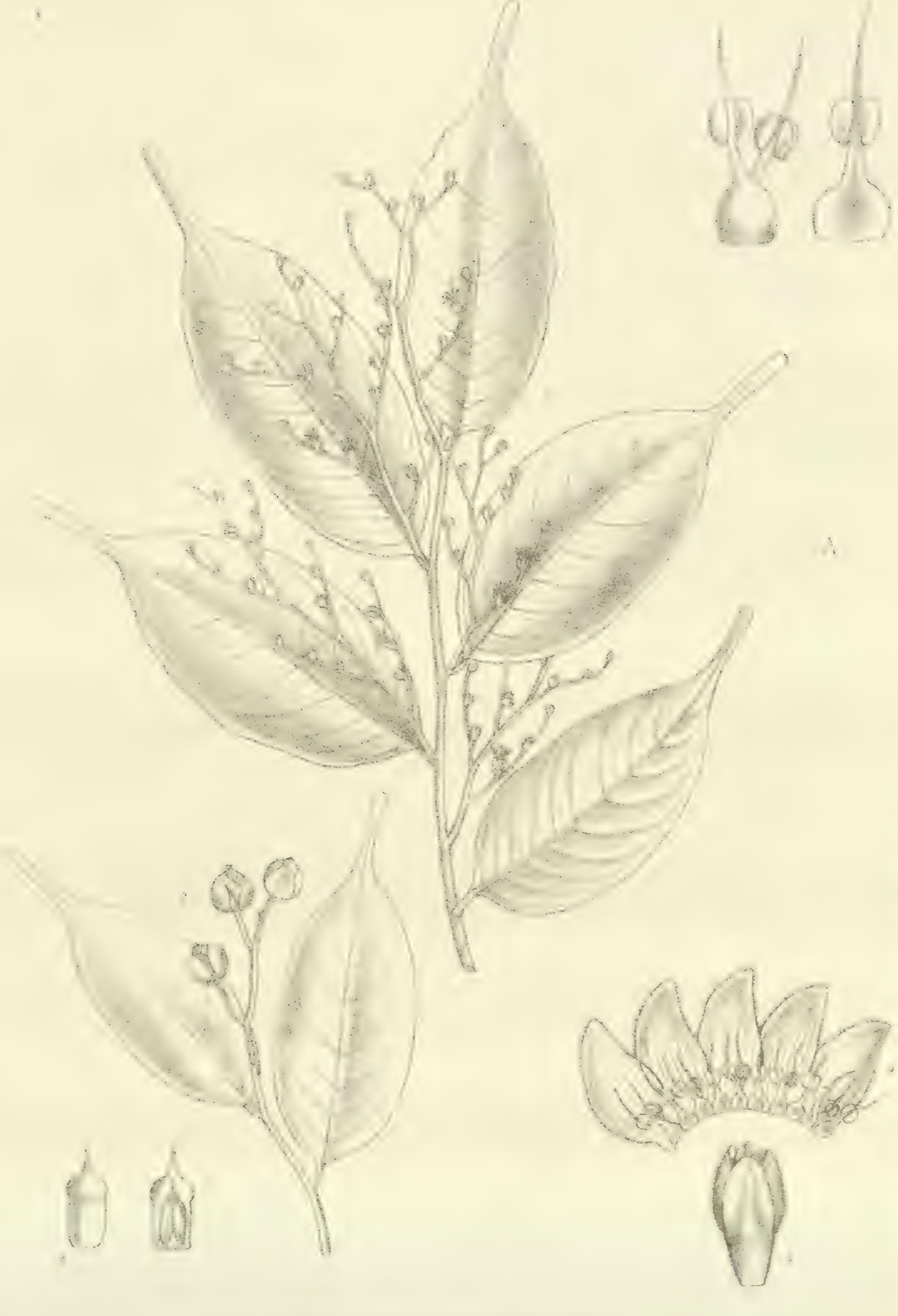
Lith. by K. P. Dass.

RETINODENDRON SCORTECHINII, King.

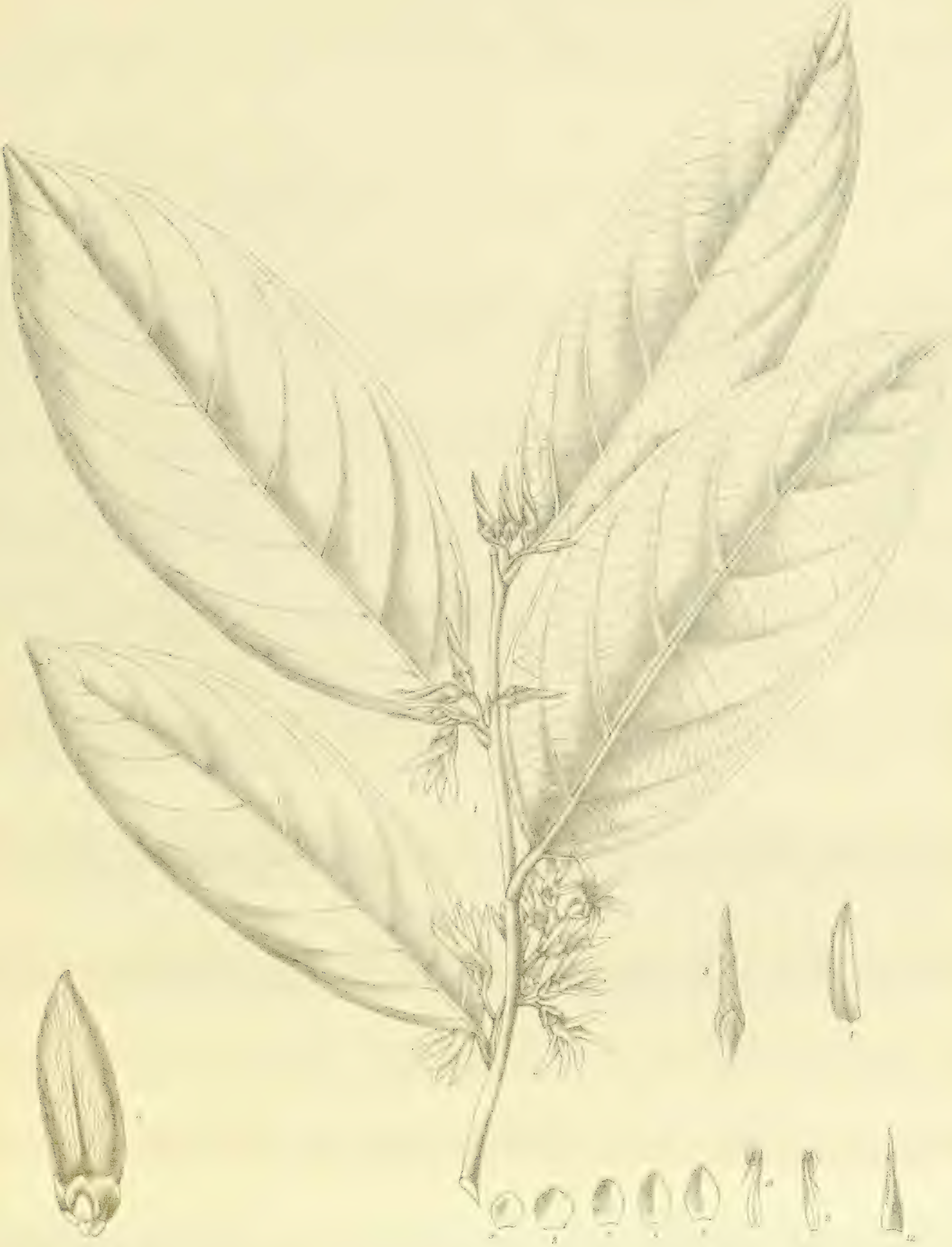


Drawn by G. C. Dass. BALANOCARPUS PENANGIANUS, King.



Drawn by K. P. Dass. BALANOCARPUS CURTISII, King.

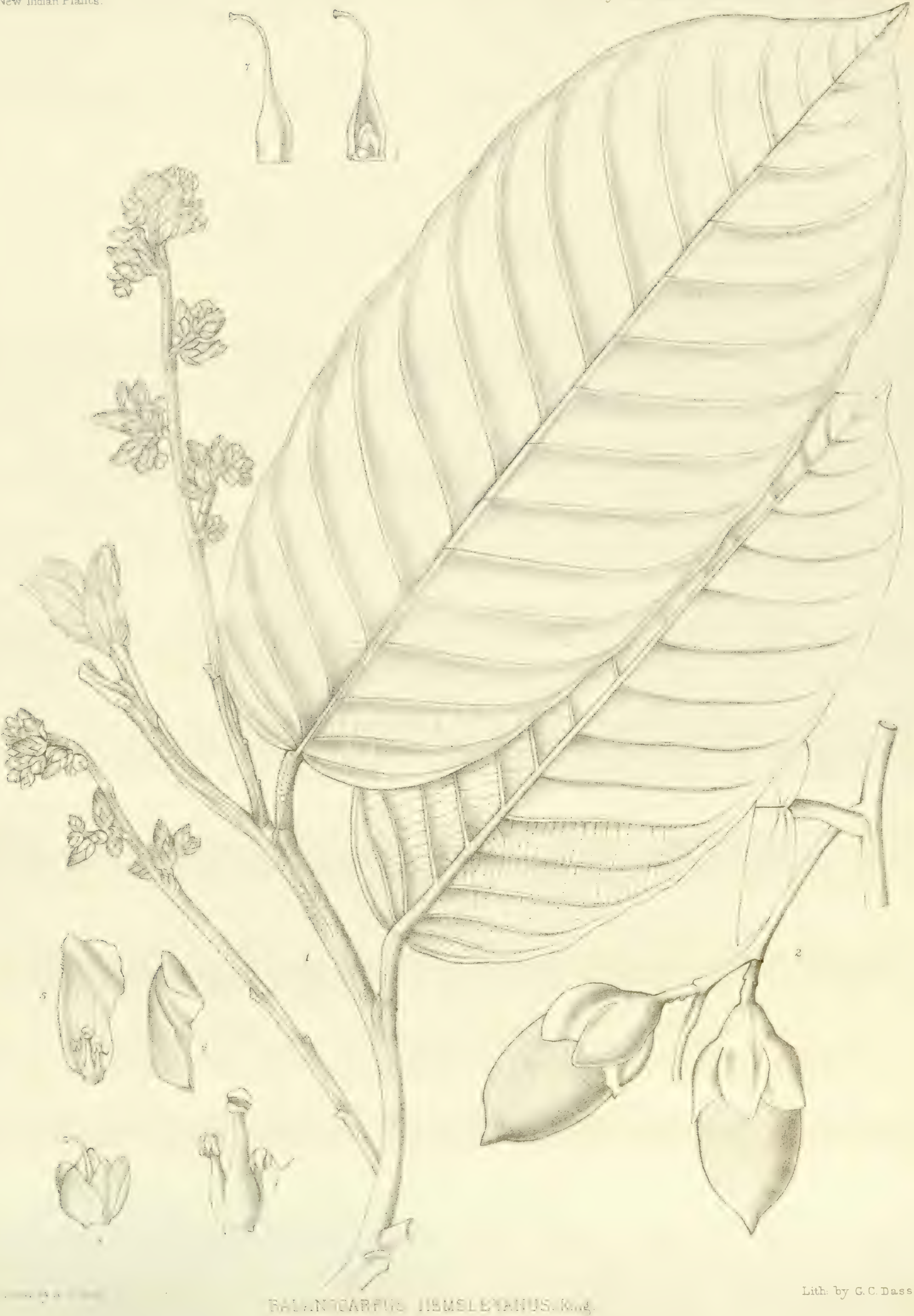
Lith: by K. P. Dass.



[illegible] by A. D. Moila.

Lith: by A. D. Moila.

BALANOCARPUS MAXIMUS, King.



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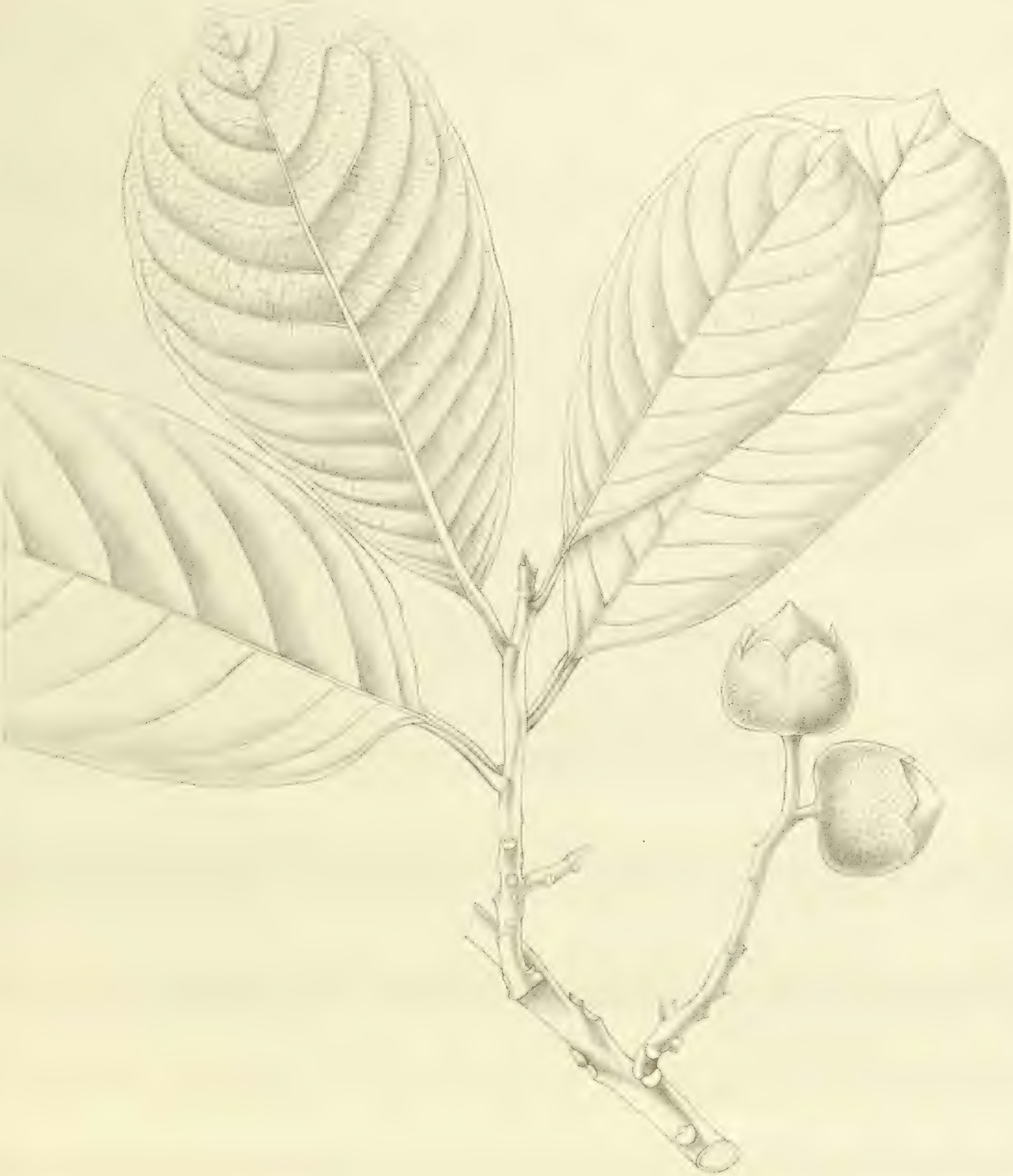
BALANOCARPUS HEMSLEYANUS. King.

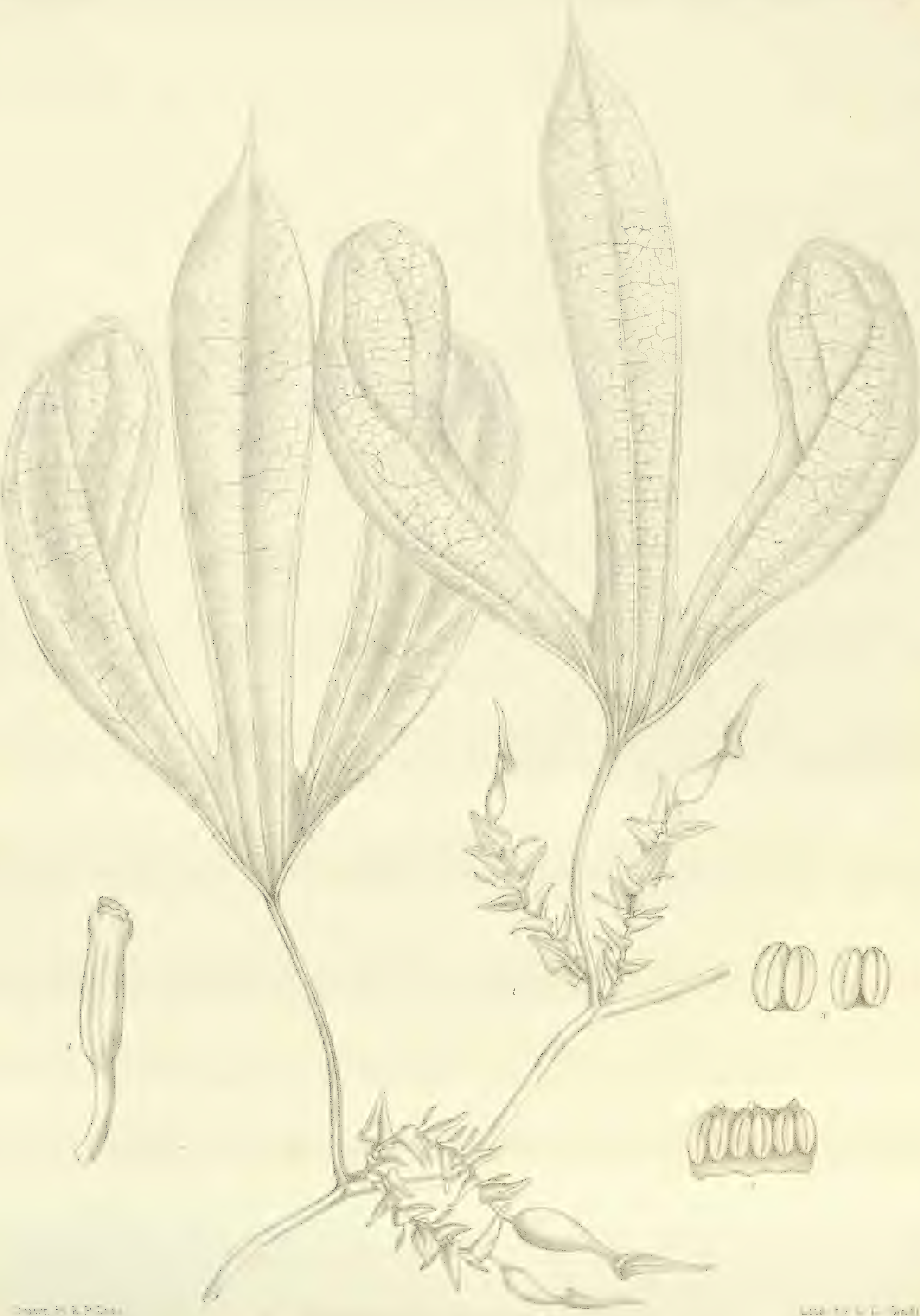
Lith: by G. C. Dass.



Drawn by B N Chowdhury.

PACHYNOCARPUS STAPFIANUS, King.

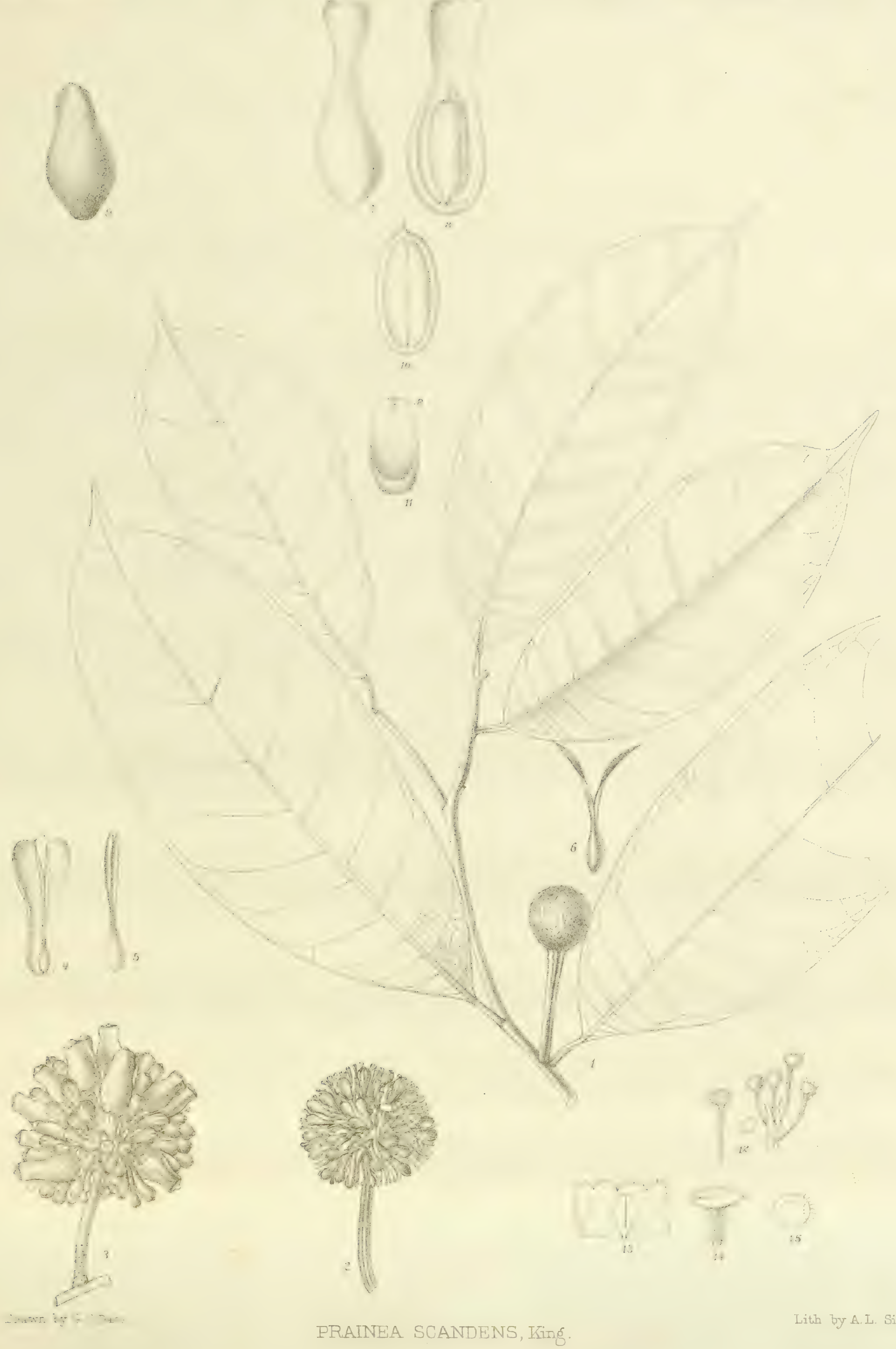
Lith by K. P. Dass.



Drawn by A. P. Das.

ARISTOLOCHIA CURTISII King.

Lith. by [illegible]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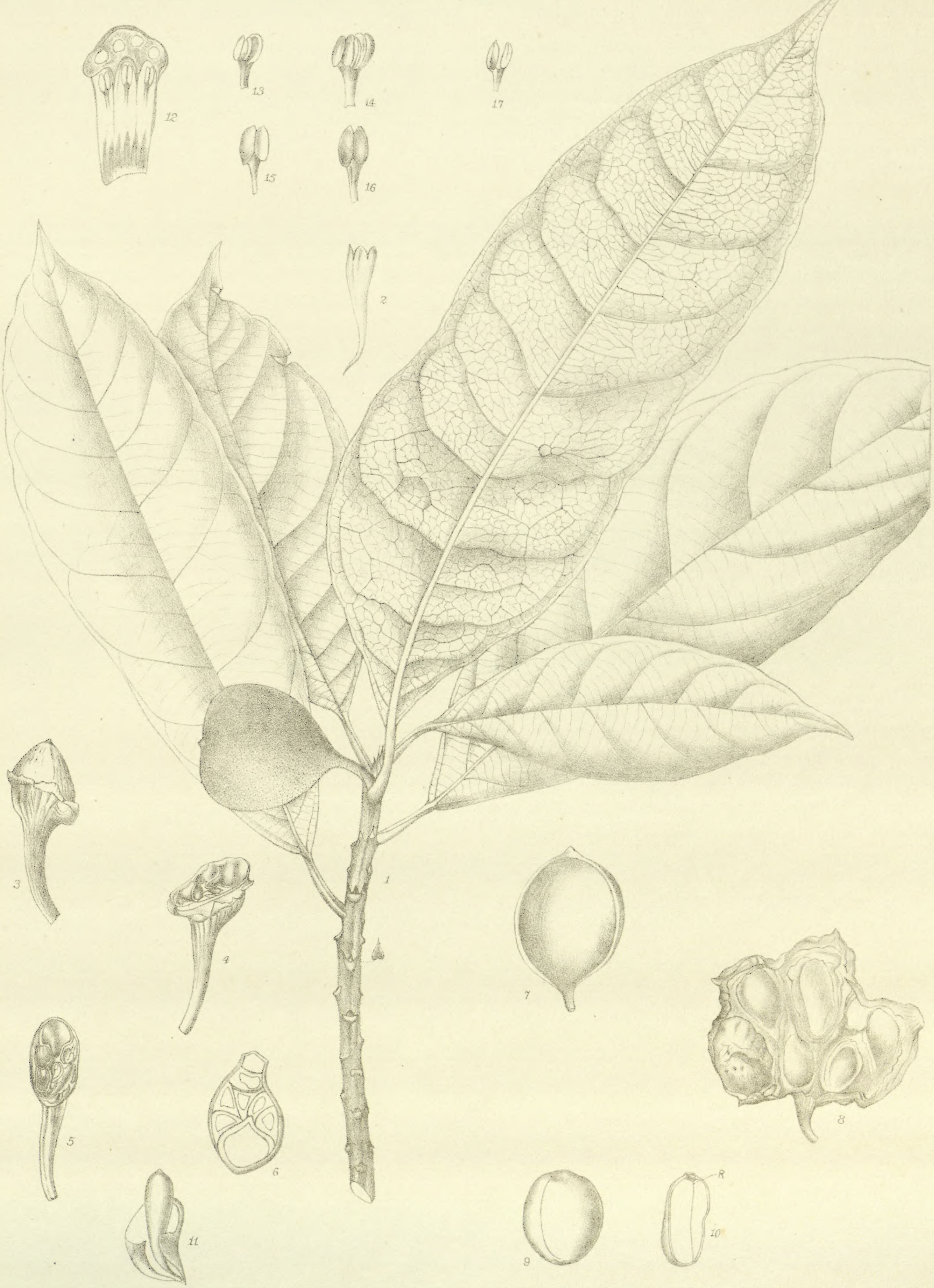
Drawn by G. Dass.

Lith by A.L. Singh.

PRAINEA SCANDENS, King.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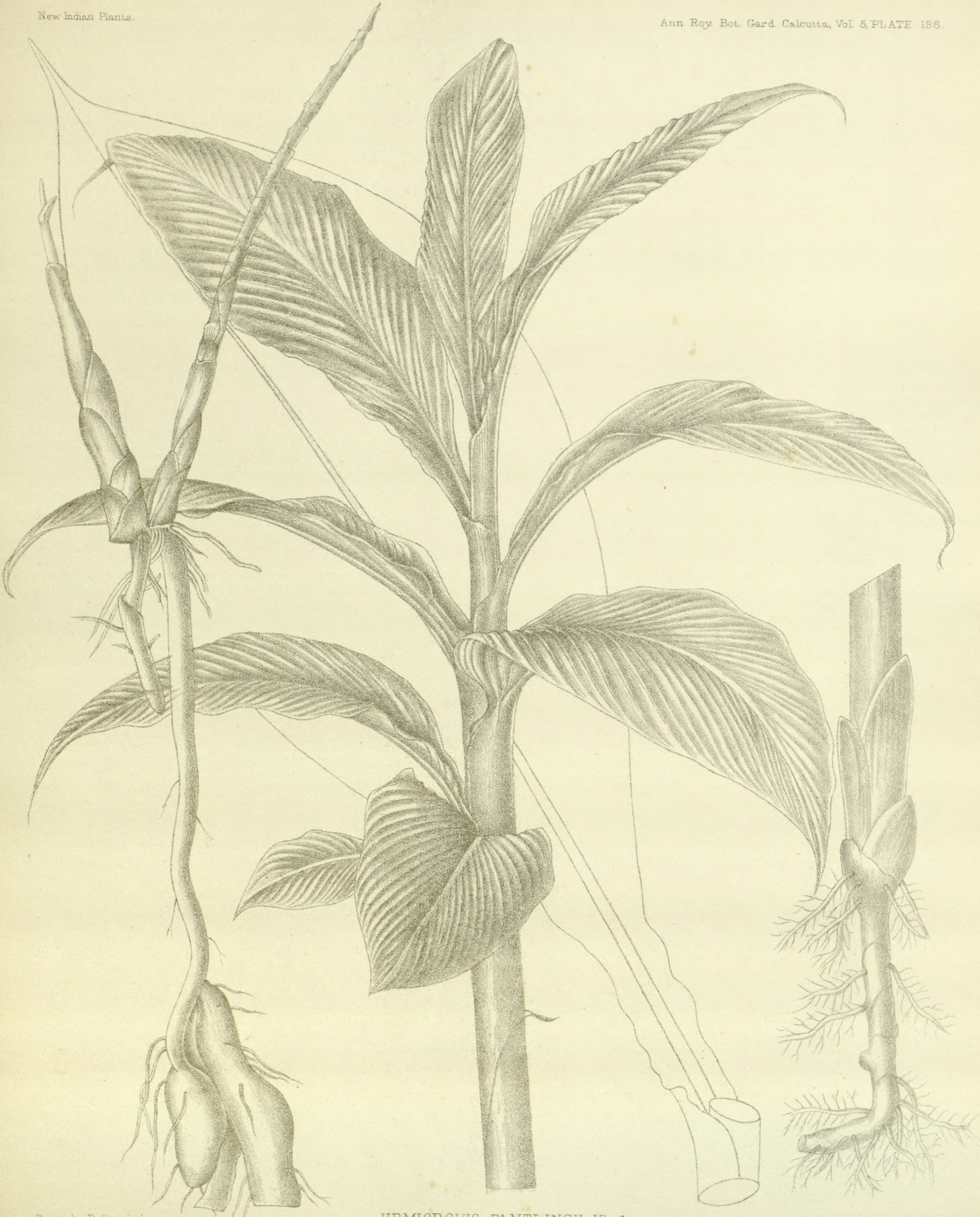
Drawn by G. C. Dass.

HULLETTIA DUMOSA, King.

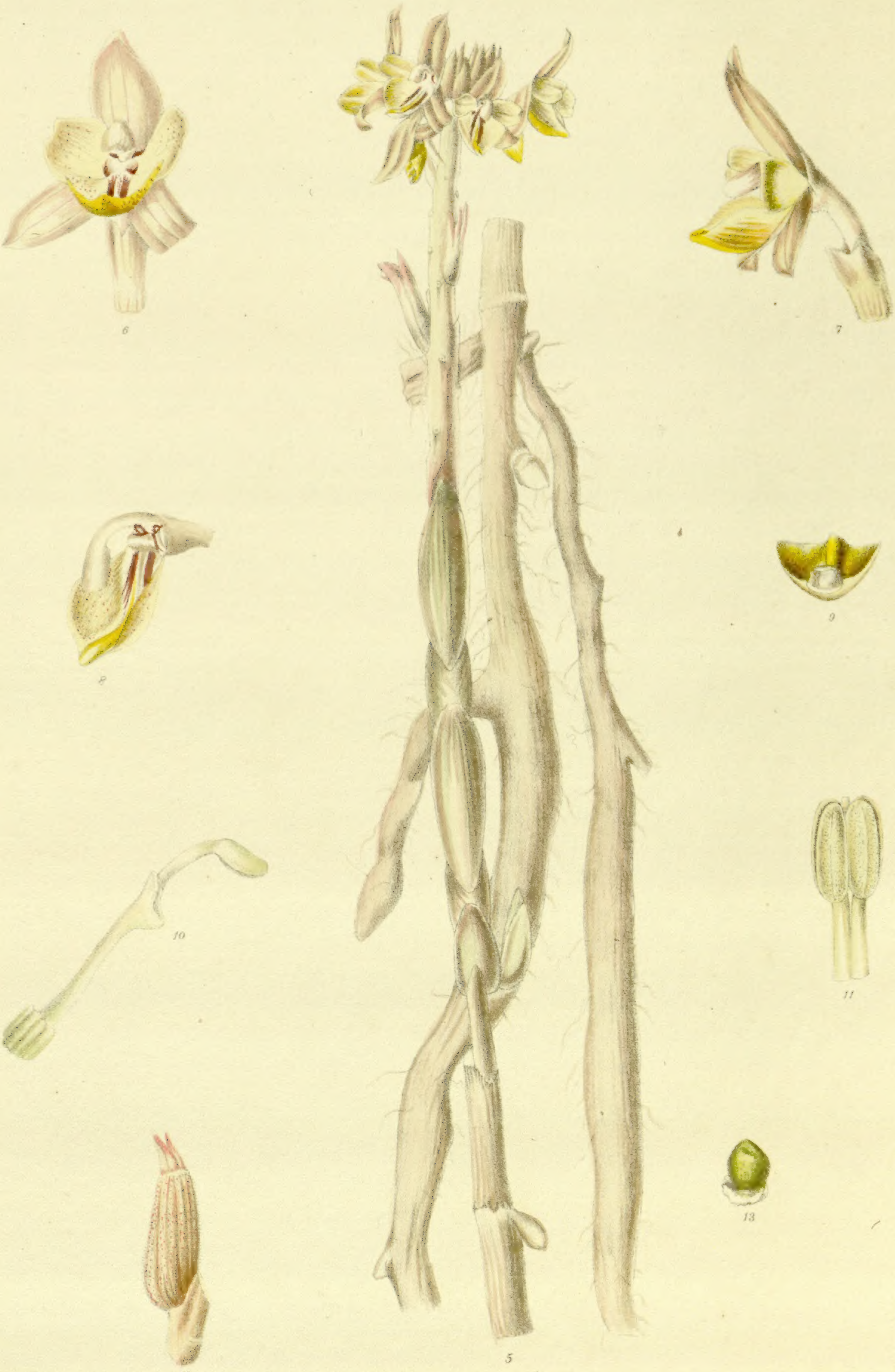
Lith: by K. P. Dass.



Drawn by R. Pantling.

HEMIORCHIS PANTLINGII, King.

Lith: by A. L. Singh.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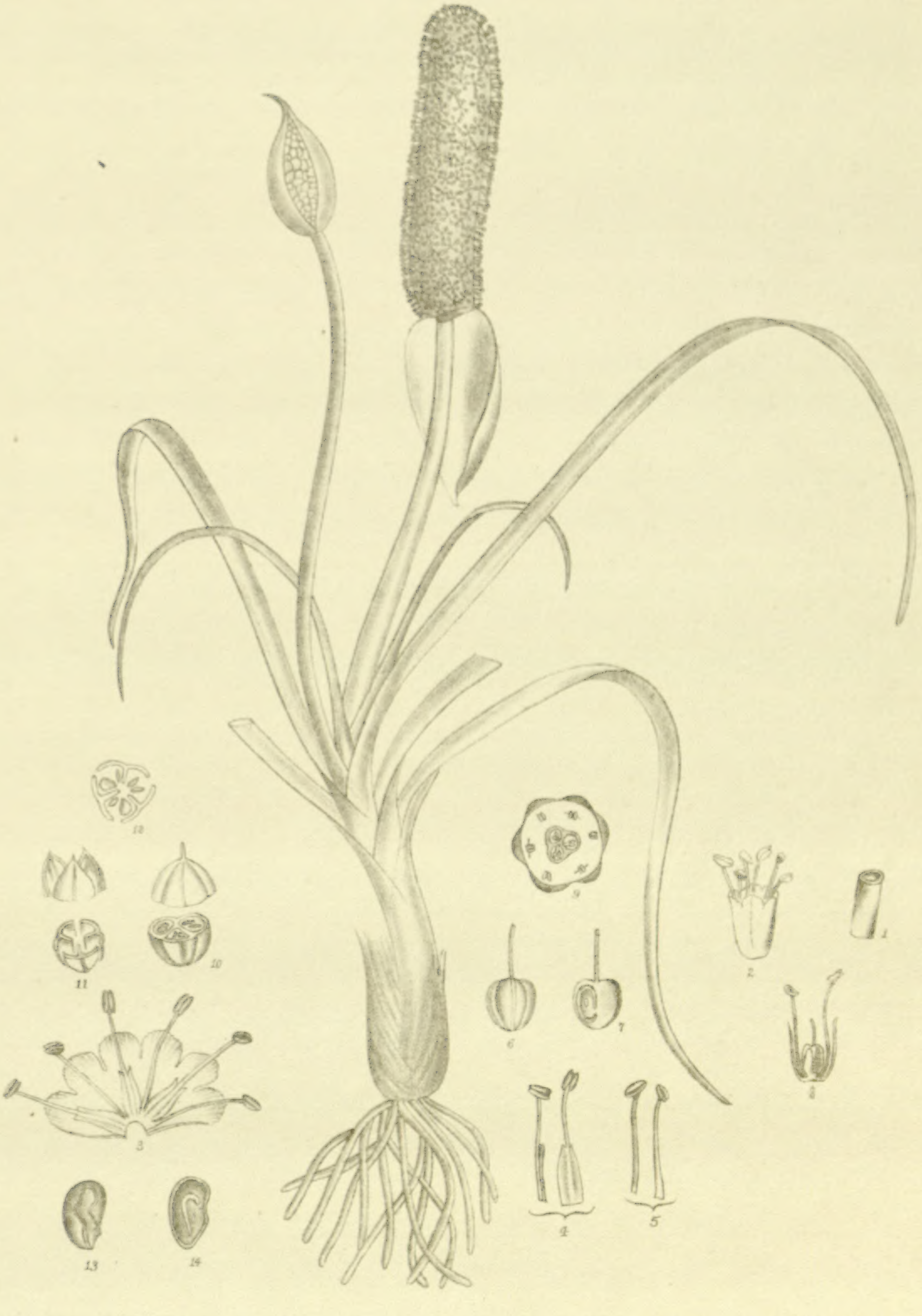
Drawn by R. Pantling.

Lith. by A. C. Chowdhary.

HEMIORCHIS PANTLINGII, King.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Drawn by D. Prain.

MILULA SPICATA, Prain.

Lith: by New Chitra Silpi Co.